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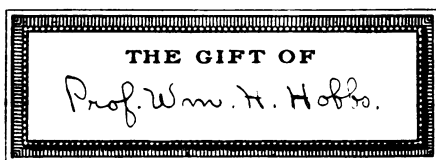
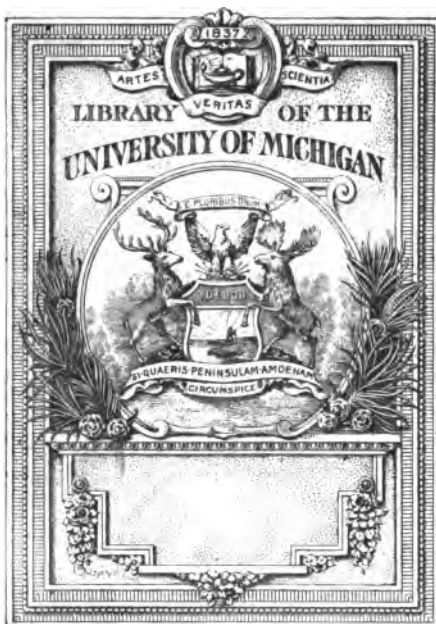
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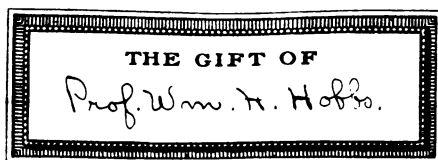
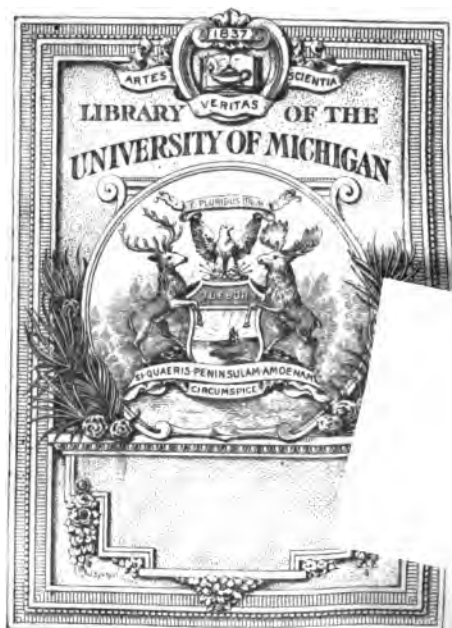
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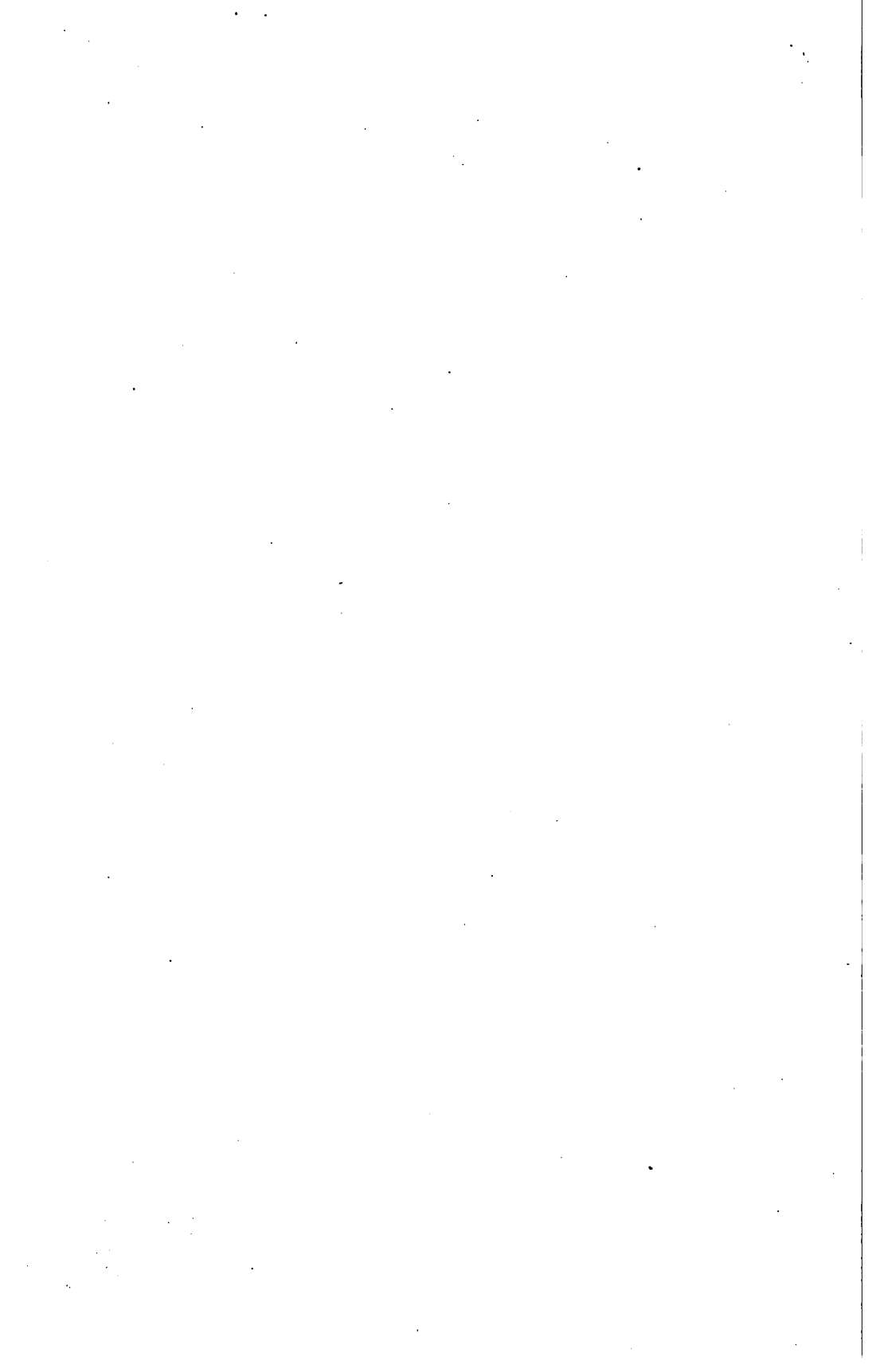
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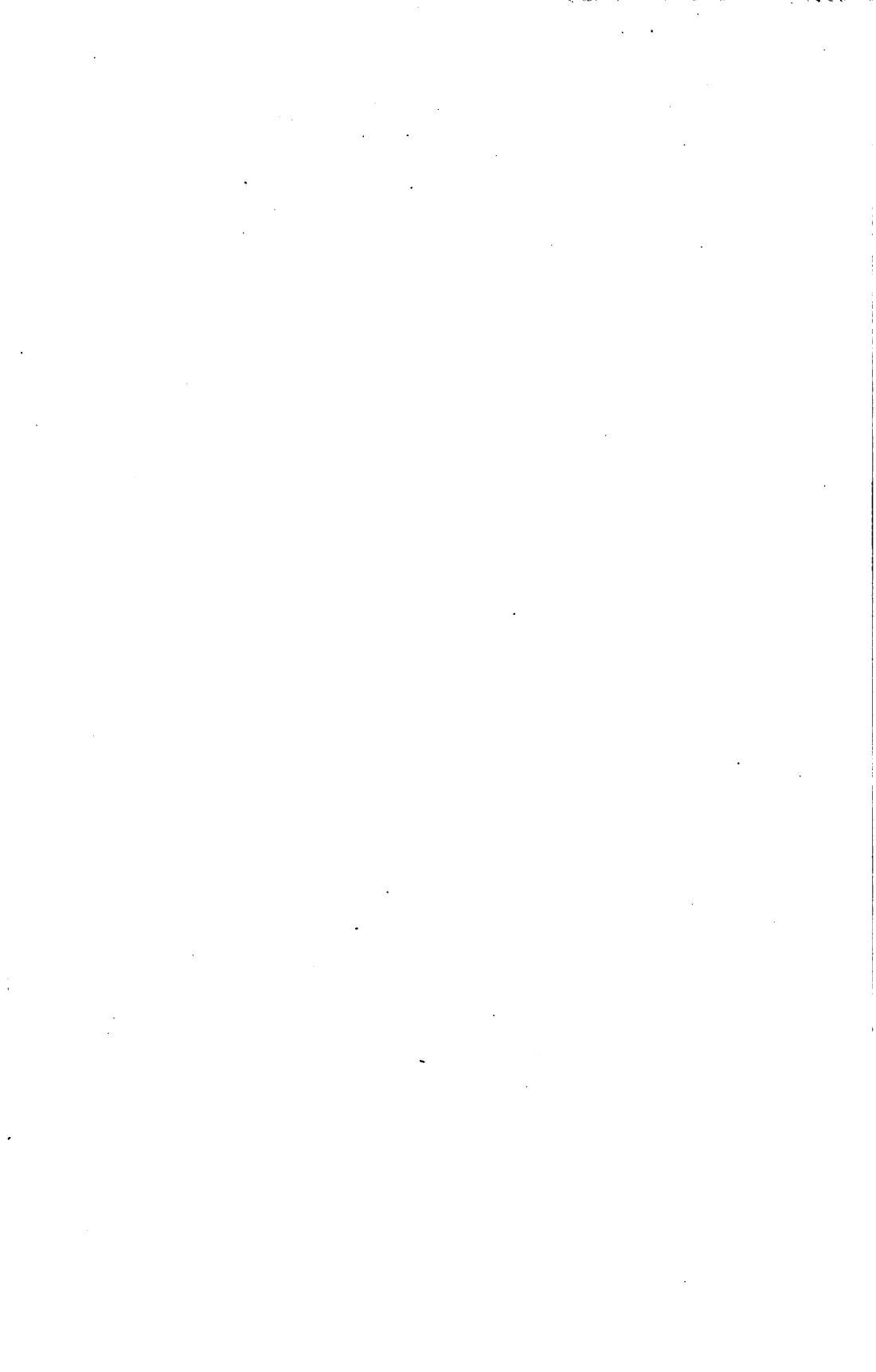
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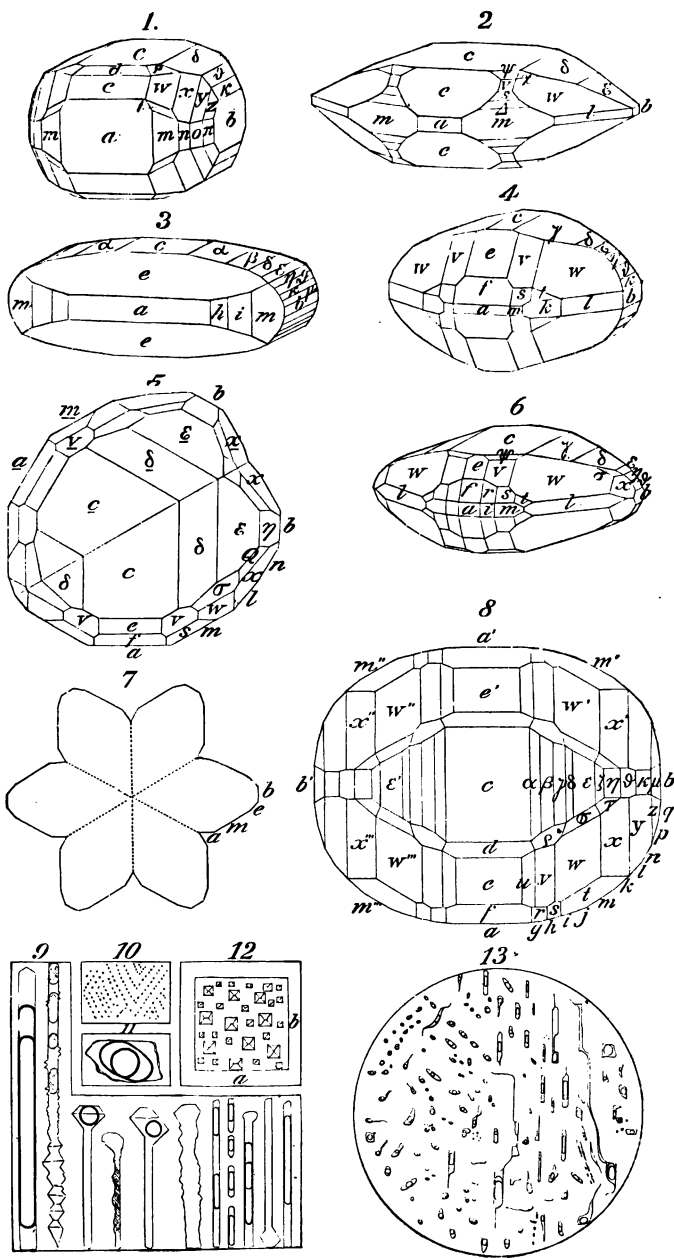
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BERYLLONITE.

NEAR STONEHAM, MAINE.

See Page 18.

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It is our earnest desire to have an unsullied reputation for integrity and justice, as we believe that upon no other basis can a permanent business be built up. The attention of parties who do not know of our standing is respectfully called to the list (on the following page) of distinguished mineralogists who kindly permit us to use their names for reference.

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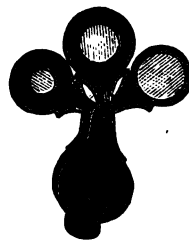
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FIRST LESSONS ON MINERALS, by Ellen H. Richards, Boston, 1889, 48 pp., paper,10
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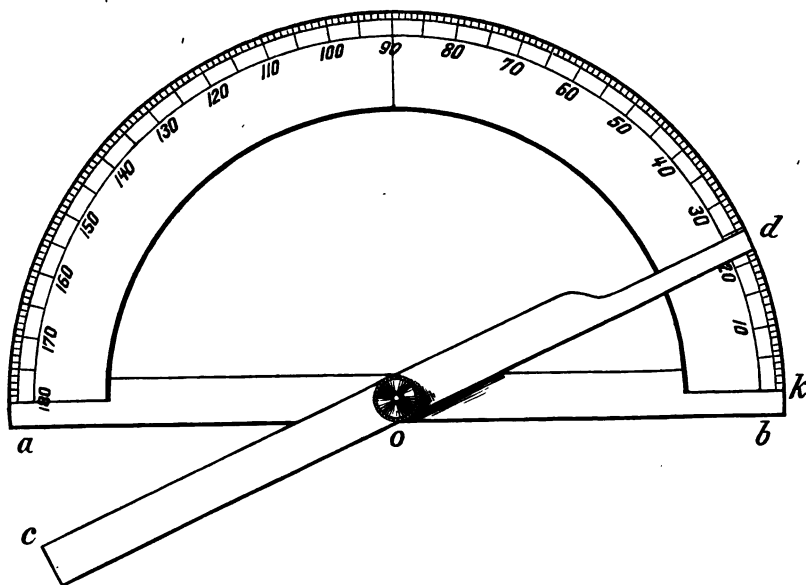
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No. 1. College Collection, 300 specimens, averaging 3 x 4 inches in size, each mounted on a hard-wood block, labeled with species number, number in collection, species, variety, crystallographic form, chemical composition, and locality, all of the above data being in accordance with the most recent investigations. The specimens all show characteristically the distinctive features of the respective species, while many of them are well crystallized and showy. This collection cannot fail to please. Price, \$250.

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Prices quoted are per pound avoirdupois.

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" French Creek	10	" Texas	05
Agate, Brazil	10	Cerite, Sweden	1 00
Alabandite, Colo.	1 50	Cerussite, Arizona	75
Albite, extra good, Va.	25	Chalcantite, Arizona	1 50
" Cleavelandite, Me.	10	Chalcocite, England, xled	1 50
~Allanite, Va.	15	Chalcophanite, N. J.	25
" Texas (new variety)	1 00	~Chalcopyrite, Pa.	05
Almandite, Colo. (analysis given) . .	50	Chlorite, see Prochlorite.	
Amazon Stone, Colo., xled	25	~Chromite, Pa.	15
" Va., cleavages	15	Chrysocolla, Arizona	50
Amblygonite, Me.	60	Chrysotile, Quebec	25
Amphibole, Conn.	05	Cinnabar, pure, Cala.	1 00
" Canada	10	" rocky "	50
~Anhydrite, N. B.	10	Cleavelandite, Me.	10
~Anthophyllite, Hydrous, Pa.	10	Colemanite, Cala.	50
Anthracite, Pa.	05	Columbite, Conn.	1 00
~Apatite, Canada	05	Copiapite, Chili	1 00
Apophyllite (on rock), Pa.	50	Copper, some rock, L. S.	30
Aragonite, best xled, England	1 00	Corundum, granular, Ga.	15
" Flos Ferri, N. M.	25	" extra, cleavable, N. C.	25
~Arsenopyrite, best, England	20	Crocidolite, Quartz pseudo of, Africa .	25
Asbestos, N. C., extra	15	~Cryolite, Greenland	15
Astrophyllite (in rock), Colo.	50	Cuprite, some rock, Arizona	75
Azurite, Arizona	50	~Cyanite, pure, N. C.	15
Barite, Va.	05	" in rock, Conn. and Pa.	15
Berthierine, France	1 00	Damourite, Me.	20
~Beryl, Conn. and Me.	15	Datolite (on rock), N. J.	75
Beryllonite, Me., per oz.	2 50	Descloizite, pure	2 00
~Biotite, Canada	20	" and Vanadinite, partly powdered .	50
~Blende, gray, massive, Pa.	20	Deweyite, with Magnesite, Md.	25
" extra cleavable, Mo.	10	~Dolomite, N. Y.	05
~Boltonite, Mass.	10	" Me.	10
Bornite, Canada	75	~Dufrenite, Va.	15
Bournonite, England	1 50	Elæolite, some rock, Me.	25
Brucite, N. J. and Pa	75	" pure, Ark.	25
~Calamine, Mo.	10	Embolite, on rock, N. M.	2 00
Calcite, N. Y.	05	~Emery, Smyrna	10
" blue, N. Y.	25	Enargite, Utah and Mon.	1 00
" orange, N. J.	20	Epidote, Me.	15
Cancrinite (in rock), Me.	20	Feldspar, extra, cleavable, Pa.	05
Cassiterite, England	25	" granular, Canada	05

- Fibrolite, Me.	10	Nicolite, Germany, per oz.	25
- Flexible Sandstone, N. C.	15	Nigrine, Ark.	25
Flint, England	05	Obsidian, Wyoming	25
- Fluorite, white, Ill.	05	Oölite, silicious, Pa.	10
" green, N. Y.	05	Opal, in gangue, Mexico	1 50
- Fowlerite, N. J.	25	Orpiment, Hungary	1 50
- Franklinite, N. J.	10	Orthoclase, extra, cleavable, Pa.	05
Freibergite, Colo.	1 50	" granular, Canada	05
Gadolinite, Texas	1 25	Ozocerite, Utah	50
Galenite, Mo.	05	Phlogopite, N. Y.	15
- Garnet, N. J.	05	Phyllite, R. I.	10
" Ga., extra	15	Pitch Stone, Colo.	25
" Almandite, Colo.	50	- Prehnite, Mass.	30
Garnierite, Oregon	50	- Prochlorite,	15
- Gibbsite, Mass.	15	- Psilomelane,	10
Göthite, Colo.	30	Pyrite, Colo.	05
" Mich.	30	- Pyrolusite, Germany	25
Graphite, Ceylon, extra	15	Pyromorphite, on rock, Pa.	50
- Gypsum, N. B.	05	" pure, Pa.	2 00
Halite, La.	05	Pyroxene, Canada	05
Hematite, N. Y.	05	Pyrrhotite, Pa.	15
" England	35	Quartz, milky, Ariz. and Colo.	05
Hexagonite, N. Y.	75	" rose, Me.	20
Hornblende, Conn.	05	" smoky, N. C. and Colo.	10
Hyd. Anthophyllite, Pa.	10	" tabular, N. C.	10
Iceland Spar, Texas	35	Realgar, Borneo, pure	2 00
- Idocrase, Me.	15	Rhodochrosite, Colo.	50
Iridosamine, Cala., per oz.	6 00	Rhodonite, N. J.	25
Iron, Meteoric, Mexico	3 00	Rubellite in Lepidolite, Me.	50
Jasper, N. M.	05	- Rutile, Ark.	25
Kaolinite, N. J.	05	Samarskite, N. C.	1 00
Keilhauite, Norway	1 50	Scapolite, Canada	05
Labradorite, N. Y.	25	" pink, Mass.	20
Lapis Lazuli, Chili	1 50	Selenite, N. Y.	10
- Lepidolite, Me.	15	Serpentine, Chrysotile, Quebec	25
Lepidomelane (in rock), Me.	10	" Williamsite, Pa.	10
Leucopyrite (in rock), N. Y.	15	Siderite, Conn.	05
Limonite, Pa.	05	Smaltite, Saxony	1 50
Lithiophilite, Conn.	1 00	Sodalite (on rock), Me.	50
Lodestone, Ark.	25	Sperryllite, Canada, per gram	3 00
- Magnesite, Greece	10	Sphalerite, gray, massive, Pa.	20
Magnetite,	05	" extra, cleavable, Mo.	10
- Malachite, Ariz., extra	50	- Sphene, Canada	15
Marble, Italy	05	- Spodumene, Me.	15
Marcasite, N. J.	10	Stannite, England	1 25
Margarite, Mass.	35	Steatite, Pa. and N.C.	05
Margarodite, Conn.	25	- Stibnite, Hungary	25
Martite, L. Sup.	25	- Strontianite, Westphalia	30
Melaconite, Ariz. and L. S.	50	Sulphur, Spain	25
- Menaccanite, N.C.	05	- Talc, N. C.	05
Meteoritic Iron, Mexico	3 00	Tennantite, England	2 50
Mica, Pa.	05	Tetrahedrite, Colo.	1 50
" curved, Me.	20	Thorite, Norway, per oz.	1 00
Microcline, Colo., xled	25	Thulite, Norway	1 00
" Va. cleavages	15	Titanite, Canada	15
Millerite, Pa.	2 00	- Topaz, Maine	20
Mispickel, England	20	Tourmaline, black, Me.	05
Molybdenite, Canada	1 50	" brown, N. Y.	15
Monazite Sand, N.C. and Brazil	1 00	" Rubellite (in Lepido-	
Muscovite, Pa.	05	dolite), Me.	50
Natrolite, N. J.	1 50	- Tremolite, N. Y.	10
Nemalite, N. J.	75	Triphylite, var. Lithiophilite, Conn.	1 00
Nephelite, var. Elæolite, q. v.		Triplite, Me.	20

-Troostite, N. J.	15	Williamsite, Pa.	10
Ulexite, Nevada	75	-Witherite, England	15
Vanadinite, Ariz., pure, per oz.	50	-Wolframite, England	35
" (on rock), Ariz.	2 00	-Wollastonite, N. Y.	15
" and Descloizite, partly powdered	50	Wulfenite, red, Arizona,	1 50
Variscite (on rock), Ark.	30	" yellow, N. M.	1 50
Vesuvianite, Me.	15	Zincite (in Calcite), N. J.	20
-Vivianite, N. J.	15	" pure, N. J.	50
Warwickite (in rock), N. Y.	50	Zircon, pure, Canada	75
Wavellite, (some rock), Ark.	20	" " N. C.	50
Wernerite, Canada	05	" in rock, Colo.	20
" pink, Mass.	20	-Zoisite, gray, Mass.	25
-Willemite, var. Troostite, N. J.	15	" Thulite, Norway	1 00
		Zunyite, in rock, Colo.	50

Loose Crystals.

THE following is a partial list of loose crystals which we now have in stock.

Amazon Stone	\$0 05 to \$1 00	Hanksite	25 to 5 00
Amethyst	10 to 1 00	Hematite	25 to 1 00
Apatite	10 to 1 00	Lazulite	05 to 50
Argentite	1 00	Lepidolite	05 to 25
Azurite	25 to 2 50	Leucite	10 to 1 00
Barite	10 to 2 50	Magnetite	05 to 25
Bertrandite	25 to 2 50	Malacon	10 to 50
Beryl	10 to 2 00	Microlite	1 00 to 6 00
Beryllonite	1 00 to 4 00	Molybdenite	10 to 50
Boracite	10 to 1 00	Orthoclase	05 to 2 50
Borax	10 to 50	Perovskite	05 to 1 00
Brookite	05 to 2 50	Phenacite	10 to 5 00
Calcite	05 to 2 00	Polybasite	10 to 50
" twins	1 00 to 10 00	Proustite	50 to 5 00
Cassiterite	10 to 50	Pyrargyrite	50 to 3 50
Celestine	10 to 1 00	Pyrite	05 to 2 50
Cerussite	10 to 1 00	Pyroxene	05 to 1 00
Chalcocite	50 to 1 50	Quartz	05 to 5 00
Chalcopyrite	05 to 50	Rutile	05 to 2 50
Chialstolite	10 to 1 00	Staurolite	05 to 25
Cobaltite	10 to 1 00	Stephanite	50 to 3 50
Colemanite	25 to 1 00	Sulphur	50 to 1 50
Columbite	50 to 1 00	Thenardite	10 to 50
Corundum	10 to 2 50	Thorite	50 to 3 50
Cuprite	10 to 1 00	Thorogummite	1 00 to 5 00
Diamond	1 00 to 5 00	Titanite	05 to 2 00
Diopside	10 to 50	Topaz	05 to 10 00
Epidote	10 to 1 50	Tourmaline	05 to 10 00
Eudialyte	50 to 2 50	Vanadinite	05 to 50
Fergusonite	50 to 5 00	Vesuvianite	10 to 1 00
Fluorite	10 to 1 00	Wernerite	05 to 50
Galenite	05 to 50	Willemite	25 to 1 00
Garnet	05 to 2 50	Witherite	25 to 1 00
Glauberite	10 to 50	Wolframite	50 to 2 00
Gypsum	05 to 50	Wulfenite	10 to 1 50
Halite	10 to 1 00	Zircon	05 to 2 50

Microscopic Mounts of Minerals.

THE microscope is almost indispensable to scientific mineralogists, not merely because of the much greater perfection and brilliancy of small crystals and their commonly more highly modified forms, but because the inclusions in minerals, their optical properties, etc., may be examined more exhaustively. The wonderful beauty of many mineral species when examined under the microscope is surprising to all who have never examined them in this manner. The difficulty of securing strictly first-class material, and the labor of mounting, have been overcome by us through an arrangement which we have completed with a distinguished microscopist, who has devoted his spare time for the past eight years almost exclusively to microscopic mineralogy. Our stock is most carefully examined by him, and all the best material for microscopic mounts is selected out, and again culled over under his microscope. Every mount in our stock is thus prepared by an expert, and is examined under his microscope before being offered for sale. Abandoning the old methods of cutting down specimens to such small size as to mount them in cells, we have adopted the far more satisfactory method of mounting in boxes. A specimen even as large as an inch by three-fourths can, by this method, be mounted as an opaque object, and examined exactly as it is found in nature. By far the best results are ordinarily obtained by the use of a one-and-a-half-inch objective and an "A" eye-piece. An inch or eight-tenths objective will also be found useful, but a higher power lens will but rarely be needed. A parabolic reflector is an almost indispensable attachment for lighting up deep cavities, while the bull's-eye condenser is always needed at night. We cordially recommend to our patrons the microscopes and attachments of J. Zentmayer, of Philadelphia, as being in every way equal to, if not better than, the best American or European makes. Mr. Zentmayer's catalogue will be forwarded by us to parties desiring it, and orders sent to us will have prompt attention.

The following is a list of the species we have mounted at the present time. Additions are rapidly being made, so that customers desiring species not in this list are requested to communicate with us. The universal commendation which our mounts have received, and the rapidly increasing demand for them, are the best recommendations that we could present. Our price is only twenty-five cents per mount. A few rare species, such as Cacozenite, Childrenite, Erythrite, Eulytite, Herrengrundite, and Lettsomite, can be supplied at 50c. to \$1.00 each.

Adamite.	Chalcotrichite.	Marcasite.	Siderite.
Amarantite.	Chrysocolla.	Millerite.	Silver.
Anglesite.	Cinnabar.	Mimetite.	Smithsonite.
Ankerite.	Clinoclasite.	Mixite.	Sperrylite.
Apatite.	Colemanite.	Monazite Sand.	Spessartite.
Apophyllite.	Conichalcite.	Olivinite.	Sphalerite.
Aragonite.	Copper, Native.	Ouvarovite.	Spinel.
Atacamite.	Cuprite.	Pharmacosiderite.	Stibnite.
Aurichalcite.	Descloizite.	Phenacite.	Stilbite.
Azurite.	Embolite.	Platinum Sand.	Stilpnomelane.
Bertrandite.	Epidote.	Polybasite.	Sulphur.
Blende.	Erinite.	Prochlorite.	Sunstone.
Breislakite.	Gahnite in Mica.	Pyrite.	Tennantite.
Brochantite.	Garnet.	Pyromorphite.	Tetrahedrite.
Byssolite.	Gold.	Pyroxene.	Torbernite.
Calamine.	Göthite.	Quartz—	Tyrolite.
Calcite.	Hematite.	Ferruginous.	Ulexite.
Caledonite.	Heulandite.	Stalactitic.	Utahite.
Celestite.	Hübnerite.	on Chrysocolla.	Vanadinite.
Cerargyrite.	Hydromagnesite.	on Hematite.	" in Calcite.
Cerussite.	Jamesonite.	Realgar.	Variscite.
Chalcodite.	Jarosite.	Rhodochrosite.	Vivianite.
Chalcophanite.	Linarite.	Rutile.	Wavellite.
Chalcopyrite.	Liroconite.	Sammetblende.	Wulfenite.
Chalcosiderite.	Malachite.	Scorodite.	Zunyite.

Beryllonite,

A NEW MINERAL FROM STONEHAM, MAINE.

By Profs. E. S. Dana and H. L. Wells. *American Journal of Science*, January, 1889. (See frontispiece.)

In the October number of this journal a preliminary account was given by one of us of a new phosphate of sodium and beryllium, for which the name *Beryllonite* was proposed. We purpose now to give a more complete account of this species, the unusual interest of which has been developed by fuller study.

Locality and occurrence.—The first specimens of beryllonite were discovered near Stoneham, Maine, in 1886. . . . The Stoneham region is already well known, having afforded fine specimens of topaz, phenacite,¹ herderite and many other species of greater or less interest. . . . The early specimens, like those which have been obtained since, were found either detached in the soil or occasionally imbedded in a loosely coherent brecciated mass obviously not the original matrix. The material in which the crystals and fragments occur has evidently been derived from a granitic vein, fragments of partly kaolinized feldspar, smoky quartz crystals and other species to be mentioned being common. The exploration thus far carried on, however, has not brought to light the vein in an unaltered condition, although an apparent vein four to six feet wide of decomposed material has been found. The country rock is mica schist, which has been met with at a number of points in the course of the excavations.

The species which have been obtained from the same spot associated with the new mineral, and which probably represent its original associates in the vein are the feldspars, orthoclase and albite, smoky quartz sometimes in large crystals, mica, also columbite, cassiterite, beryl, apatite, triplite. The crystals bear evidence of having been implanted upon the rock on one side as if they had occurred in cavities rather than completely embedded. Some specimens, however, retain the impression of surrounding minerals, probably mica. A single specimen is implanted upon apatite and inclusions of apatite have been noted. The chemical agencies which have kaolinized the feldspar have also left their mark on the beryllonite the surfaces of which are often roughened or in some cases delicately etched.

Crystalline Form.—The specimens in hand are in large part fragments of crystals, ranging from those presenting a surface of an inch or two square and weighing 40 to 50 grams down to the size of a pea. Well

¹ The topaz and phenacite locality is not in Stoneham, but on Bald Face Mount, North Chat-ham, New Hampshire, just across the state line, six or seven miles west of the beryllonite locality.

formed crystals are rare; the largest is somewhat more than an inch across. All the specimens show a highly perfect basal cleavage (*c*), yielding easily smooth, lustrous surfaces. Exactly at right angles to this (measured $90^{\circ} 0'$ and $89^{\circ} 59\frac{1}{2}'$) is a second cleavage, somewhat interrupted and obtained with a little difficulty; the third pinacoidal cleavage is faintly indicated in the rectangular form of some of the broken fragments, and a fourth cleavage is sometimes distinct parallel to a prism of 60° . Twins are common in which the twinning plane is a prism also of sensibly 60° , but it is found that the twinning prism and the cleavage prism, though having nearly the same angle, are not identical. Of the two positions suggested by these facts it has seemed best to follow the usage in most similar cases and make the twinning plane the unit prism. Adopting this, the second cleavage corresponds to the macropinacoid (*a*), the imperfect pinacoidal cleavage is brachydiagonal (*b*) and the cleavage prism has the symbol 130 (i_3).

The material at hand for exact measurement is very scanty. With very few exceptions the planes have lost their original lustre, and give no reflections at all. A few angles, however, could be measured, and with sufficient exactness to yield a satisfactory axial ratio. For fundamental angles the following were accepted:

$$001 \wedge 111 = 47^{\circ} 51\frac{1}{2}', 001 \wedge 021 = 47^{\circ} 40\frac{1}{2}'.$$

Each of these is the mean of two independent angles on different crystals of equal degrees of accuracy, not involving a probable error of more than $\pm 1'$; these are:

$$47^{\circ} 51' \text{ and } 47^{\circ} 52', \text{ also } 47^{\circ} 40' \text{ and } 47^{\circ} 41'.$$

The axial ratio obtained is:

$$a : b : c = 0.57243 : 1 : 0.54901; \text{ also the angles } 100 \wedge 110 = 29^{\circ} 47' 17'', \\ 001 \wedge 101 = 43^{\circ} 48' 13'', 001 \wedge 011 = 28^{\circ} 46' 2''.$$

The measured angles, the symmetry in arrangement of the planes, and the optical characters all conform to the orthorhombic system. As confirming the accuracy of these elements we have:

Measured.	Calculated.
$021 \wedge 02\bar{1} = 84^{\circ} 41'$	$84^{\circ} 39'$
$023 \wedge 02\bar{3} = 139^{\circ} 46'$	$139^{\circ} 48'$
$100 \wedge 130 = 59^{\circ} 45' \text{ Cleavage.}$	$59^{\circ} 47'$

* * *

In habit the crystals vary from short prismatic to tabular, as shown in Figs. 1 to 6; the aspect changes considerably with the change in relative size of the pyramids; of these, *w* (121, 2-2) is usually most prominent. The crystals are remarkable for the number of planes which they present. The prismatic and brachydome zones are both highly developed, and it is not uncommon to note the presence of eight or more distinct planes in

each zone on a single crystal. It is also interesting to note that eleven of the twelve prismatic planes have representatives in the brachydome series, and, furthermore, they have nearly equal angles, since the axes \tilde{a} and \tilde{c} have approximately the same length.

Some idea of the complexity of the form may be gained from Fig. 8, which is a basal projection of a single crystal, simplified by the omission of several minute but distinct planes. The prismatic faces are often narrow, and by their oscillatory combination produce vertical striations, especially on a ; the faces of the pyramid v also show sometimes striations parallel to the edge v/f .

* * *

All the planes have very simple symbols, and furthermore they are so tied together by zones that the symbols of a large part can be determined without measurement.

* * *

Twins.—The existence of contact twins with m (110) as the twinning plane has already been noted. These have $aa=120^\circ 25'$, measured $120^\circ 22'$, also bb $59^\circ 35'$. These twins are common and lead to many interesting variations in the form. A basal projection of one twin is given in Fig. 5. Repeated twinning is not uncommon; in several cases a large crystal mass was observed having its edge formed of highly modified partial crystals in successive twinning position; some of these suggest crystals of bournonite in aspect. In a single case a part of a stellate form was noted which is idealized in Fig. 7. It was too imperfect to allow of determining the exact method of grouping, but the presence of a six-rayed star was clear. These twins are remarkable among similar pseudo-hexagonal forms, because the variation from the required 60° is so small.

General Physical Characters.—The cleavages already noted are: highly perfect parallel to c ; less perfect and interrupted parallel to a ; still less distinct parallel to n (130), and faintly indicated parallel to b . The fracture is very perfect conchoidal, yielding lustrous surfaces suggestive of glassy quartz. Hardness 5.5—6. Specific gravity=2.845. Lustre vitreous and brilliant, but on a natural basal face (c) sometimes pearly. Colorless to white, or slightly yellowish when not perfectly clear. Transparent.

Optical characters.—The axes of elasticity coincide in position with the crystallographic axes. The axial plane is parallel to a , and the acute bisectrix normal to c , so that a cleavage fragment shows the axes on the border of the field of the polariscope. The dispersion is small, $\rho < \nu$. The double refraction is negative, in other words a is the bisectrix. Sections cut normal to the bisectrices gave the following for the axial angles:

	Red (Li.)	Yellow (Na.)	Green (Tl.)
2E	120° 26'	121° 1'	121° 24'
Also			
2H _a	72° 35'	72° 47'	73° 01'
2H _o	125° 13'	124° 59'	124° 30'
Also 2V _y	=67° 34'		

A prism afforded by a crystal whose edge was parallel to the axis α , and whose faces were formed by the planes δ (023), gave tolerable values of two of the refractive indices; the faces, however, were not quite smooth, so that no very high degree of accuracy can be claimed for them. The results for yellow (Na.) are: $\beta=1.5580$, and $\gamma=1.5630$. Another prism was obtained, having the same edge, but the faces did not make quite equal angles, as was intended, with the axis \bar{b} , which should have bisected the prismatic edge; the values of β are, therefore, fairly good, while those of γ are somewhat too small. Another prism with an edge just parallel to the axis \bar{c} gave good values of the index α .

	Red (Li.)	Yellow (Na.)	Green (Tl.)
α	1.5492	1.5520	1.5544
β	1.5550	1.5579	1.5604
γ	1.5604	1.5608	1.5636

It will be seen from these results that the refractive power of the mineral is not especially high, varying but little from that of quartz, which has $\omega=1.5442$, $\epsilon=1.5533$ for Na.

Etchings.—It has already been remarked that the crystalline faces are almost always dull, and in some cases show natural etching figures as the result of the action of some solvent upon them. These figures have often great regularity and beauty, and merit more detailed study than our limited time has permitted us to give them. They are most distinct on the basal plane, where they appear as nearly square depressions closely crowded together, at first sight suggesting tetragonal symmetry. Fig. 12 will give some idea of the appearance of a portion of the surface; in some cases these pittings run across the basal face in diagonal lines. A more careful examination shows that while square, or nearly so, in outline, the symmetry is rhombic. The little pits are bounded within by two surfaces in the zone bc , making an angle of 22° with each other, and in the zone ac the prominent surfaces are inclined about 11° , while occasionally other deeper faces inclined 21° are also noted. The angles can be only roughly measured, but they suggest 013 (β) and 1.0.10, 105 as probable symbols for the faces in question. The planes in the two series of domes also show at times distinct etching figures . . . but the form is less distinct, though in general acute trowel-shaped with vertex pointed upward.

. . . The *b* faces often show longitudinal figures . . . and others transverse, but their form is not distinct; this is also true to some extent of the prismatic faces. The other planes are almost always slightly roughened, but distinct figures are not often to be made out. Not infrequently the solvent action on the crystals has gone so far as to leave only rounded angles with indistinct planes.

Inclusions.—Another interesting feature of this mineral is the presence of great numbers of fluid inclusions. A superficial examination shows the common existence of a columnar structure normal to the cleavage plane. This is seen in thin sections to be due to great numbers of slender canals parallel to the vertical axis. In some cases these seem to be hollow or filled with earthy matter, but in others they appear as fluid cavities with long bubbles. These vertical canals and fluid cavities are often thickly crowded together, sometimes extending from base to base, and again starting from a sharply defined plane within the crystal parallel to the base. The forms of some of these are shown in Fig. 9 ($\times 90$). Not infrequently, instead of a long cavity, we have a line of them present, all lying in the same direction. Besides these regular cavities there are also groups of fine parallel or wavy lines inclined sharply to *c*, and giving rise to a peculiar sheen; these are probably also hollow canals.

There are, further, multitudes of other fluid cavities, often so small as to require a high power of the microscope, either crowded together on an irregular wavy surface passing through a crystal after the manner so common in smoky quartz, or again more or less regularly orientated, parallel to the vertical axis or inclined to it in lines of 45° or 30° . The last becomes a V-shaped arrangement of the minute inclusions in some restricted areas, as is shown in Fig. 10. Fig. 13 shows the usual arrangement and common forms of the cavities ($\times 90$). As a rule, these cavities, even the smallest, contain each its own bubble, and very frequently two bubbles are noted (*cf.* Fig. 11) often of nearly the same size. This fact, the disappearance of the second bubble with slight rise in temperature, and further the presence or absence of a broad dark rim to the bubble, show the nature of the liquids and gases present. In many of the cases we have water with liquid carbon dioxide, and frequently also within this carbon dioxide gas. Occasionally the bubble appears to be air in water, and more rarely the cavity is partly filled with a liquid (CO_2) which does not wet its sides. Solid inclusions, sometimes macroscopic, are also noted.

Chemical examination.—Qualitative tests showed that the mineral is slowly but completely soluble in acids; that it is an anhydrous phosphate of sodium and beryllium, containing no other acids and bases, and especially careful tests proved the absence of fluorine, aluminum, potassium and lithium. Before the blowpipe it decrepitates and fuses about 3

to a somewhat clouded glass, coloring the flame deep yellow, with a tinge of green on the lower edge.

A quantitative analysis gave the following results :

	I.	II.	III.	IV.	V.	VI.	Mean.	Ratio.	Calculated for NaBePO ₄ .	
P ₂ O ₅ ,	56.09	55.66	55.84	. . .	. . .	. . .	55.86÷	142=	392=1.	55.82
BeO,	. . .	19.87	19.85	19.81	. . .	. . .	19.84÷	25.2=	787=2.	19.81
Na ₂ O,	. . .	. . .	. . .	. . .	23.68	23.59	23.64÷	62.=	381=1.	24.37
Ign.,	. . .	0.07	0.09	. . .	. . .	. . .	0.08			. . .
							99.42			100.00

It is evident from this analysis that the mineral has the composition represented by the formula Na₂O.2BeO.P₂O₅, or NaBePO₄.

Method of Analysis.

Relations to other species.—As has been shown above, the general formula of beryllonite is analogous to that of triphylite and lithiophilite, viz. :

Beryllonite.
NaBePO₄.

Triphylite—Lithiophilite
Li(Fe,Mn)PO₄.

There does not appear, however, to be as close a relation between the forms as might be expected, although our knowledge of triphylite in this respect is scanty. A closer relation seems to exist to the only other phosphate in which beryllium is known to exist, that is herderite. This has the composition (CaF)BePO₄ in which the univalent group CaF (partly replaced by CaOH) corresponds to the sodium of the beryllonite. In form the two minerals are apparently related.

* * *

The optical relations do not correspond very closely except in the size of the axial angle, for which we have in herderite $2H_{ax.}=72^{\circ} 12' D_x$. The refractive power of beryllonite is a little lower than that of herderite ($\beta=1.6$). It is certainly most interesting that these two beryllium phosphates should be found within a few miles of each other, and that the same region should have yielded the rare beryllium silicate phenacite.

* * *

[We can supply fairly good crystals of beryllonite at \$1.00 to \$4.00; cleavages, 10c. to \$1.00.]

Herkimer Co. Quartz Crystals.

The perfection and beauty of these crystals make them always in demand. We have several thousand crystals in stock. Extra choice specimens cost considerable (50c. to \$4.00 each); but excellent crystals can be had at 5c. to 25c. Figures 23 and 24 show two of the commonest forms.

Some of the crystals show enclosures of carbon, occasionally movable; others have movable bubbles in them. Such enclosures can be supplied at 50c. to \$5.00 each.



No. 23.



No. 24.

Franklin Minerals.

The celebrated mines in Sussex County, New Jersey, have not yielded any good specimens for nearly three years. We can supply typical specimens of average quality from our old stock at most reasonable prices.

Franklinite crystals, 25 cents to \$2.50.

Troostite crystals, 25 cents to \$1.50.

Rhodonite, var. *Fowlerite*, crystallized, 25 cents to \$3.50.

Zincite, 10 cents to \$1.50. *Calamine*, 25 cents to \$3.50.

Dyshuite, 25 cents to \$2.50. *Chalcophanite*, 10 cents to \$1.00.

Heterolite, 10 cents to \$1.00. *Sussexite*, 50 cents to \$2.00.

Jeffersonite, 10 cents to \$1.00. *Spinel*, 25 cents to \$1.00.

Green Tourmaline, 10 cents to \$1.00.

Also, Calcozincite, Polyadelphite and Melanite Garnets, Tephroite, Ruby Corundum, Yellow Willemite, Amazon Stone, Orange Calcite, Automolite Crystals, etc.

Bementite.—In June, 1887, a small pocket of a fibrous mineral, not very unlike Pyrophyllite in appearance, was found in the Trotter Mine, at Franklin. Analysis of it was made by Prof. G. A. König, who described it, October 25th, 1887, before the Academy of Natural Sciences of Philadelphia, and named it Bementite, in honor of Mr. C. S. Bement, the well-known collector. The analysis is as follows:

SiO ₂	39.00
MnO	42.12
H ₂ O	8.44
FeO	3.75
ZnO	2.86
MgO	3.83
	<hr/>
	100.00

We have secured every obtainable specimen of the mineral, and can supply specimens at 10 cents to \$3.50 each. A new variety of Serpentine, identified by Prof. König, is generally associated with the Bementite.

Pyrite Crystals from French Creek, Pa.

By Prof. S. L. Penfield (*Amer. Jour. Science*, March, '89).

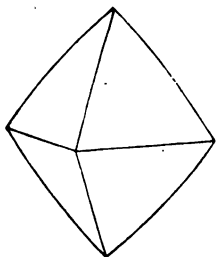
Ordinarily simple octahedrons and cubes of pyrite occur at French Creek, Pa., while occasionally rarer combinations are met with, as the cube with π (420), $\frac{1}{2}$ (4-2). The crystals are bright and have a good lustre, but are usually covered with vicinal faces and are sometimes quite distorted by them. The crystals which are to be especially described in the present article, are five which are in the collection of Mr. C. S. Bement of Philadelphia, and two in the collection of Prof. Geo. J. Brush of New Haven. . . . They are in all cases isolated crystals, built out in all directions and showing no attachment. I have been unable to obtain any exact information as to their mode of occurrence, and can only state that they are very rare and are from the iron mines of French Creek.

The special peculiarity of these crystals is that they are abnormally developed, *i.e.*, lengthened out, in the direction of one of the crystallographic axes. If we take this direction as the vertical, the crystals will appear either as steep tetragonal or orthorhombic pyramids. In all cases the pyramidal faces are curved toward the apex and as a result of this the pole edges, running from the lateral to the vertical axes, are curved, while the middle edges, running between the lateral axes, are perfectly straight. Owing to this curving, the angles between the faces cannot be measured with the reflecting goniometer, and admit of only approximate measurement with the contact goniometer. The crystals have a remarkably perfect geometrical development, that is, similar faces are developed to almost exactly the same size and extent.

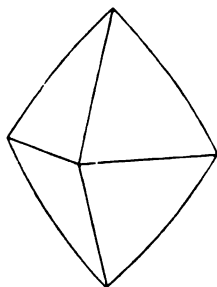
The first three crystals to be described, which are in the Bement collection, appear as tetragonal pyramids. By measurement of the interfacial angles over and near to the middle edges, the faces were found to be steep enough to cut the vertical axes at 1.25, 1.50 and 1.80 respectively, but owing to the curving the distances at which the faces actually intercept the vertical axes are less. Figures 25, 26, and 27 represent the three crystals, drawn with the same length of the lateral axes, and with the pole edges straight for a short distance from the lateral axes, and steep enough to cut the vertical axes at 1.25, 1.50 and 1.80, respectively, but curved toward the top so that the vertical axes are really cut at 1.16, 1.25 and 1.50 respectively, according to actual measurement of the diameters of the crystals. The crystals are of good size, and measure in the direction of the vertical axes respectively 22, 22 and 33 mm.

The remaining crystals are perhaps more interesting, owing to the occurrence of pyritohedral or pentagonal dodecahedral faces, which in all of the crystals occur only at the extremities of the lateral axes. The

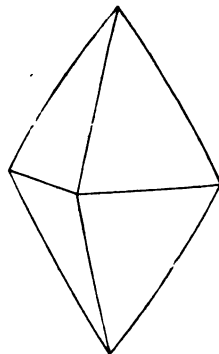
faces are rough, but approximate measurements with the contact goniometer determine the crystals to be the ordinary pyrite form e, π (210), $\frac{1}{2}$ ($i-2$). The pyramid is in all cases the curved $\frac{3}{2}$ form, r , like Fig. 26.



No. 25.

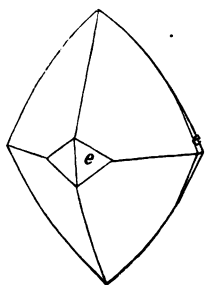


No. 26.

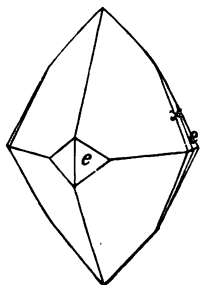


No. 27.

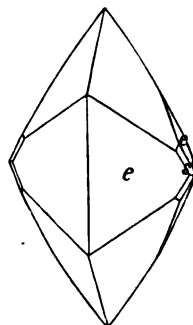
The pyramid faces are always striated near to and about the front pyritohedral faces, the striae being a little steeper than the combination edge between e and r , and having about the direction of the combination edge π (421), $\frac{1}{2}$ ($4-2$) and r . The pyritohedral faces have very different shapes at the extremities of the two lateral axes and the crystals, having only three symmetry planes, resemble orthorhombic forms. The two crystals in the Brush Collection, which are so nearly alike that they cannot be told apart, are represented in Fig. 28. [Sold to Prof. Brush by G. L. E. & Co.] Fig.



No. 28.



No. 29.



No. 30.

29 represents a crystal in the Bement Collection where the edges between the e faces at the sides and r are replaced by a form x in the zone e, r . The x faces are all rough, and admit of only approximate measurement with the contact goniometer. The symbol was determined to be $(6, 12, 7)$, $2-1\frac{1}{2}$. There are only eight of these faces, instead of the twenty-four which we should expect in an ordinary pyrite crystal. Fig. 30 represents a

crystal in the Bement collection, in which the e faces are larger. This is the most unsymmetrical of all the crystals; on the side, which is turned away from the observer, the e faces are so large that the front and side ones just meet, forming a solid angle, and leaving none of the middle edges between the lateral axes; on the other side, which is shown in the figure, the e faces are still larger, and the edges between them are replaced by the small s faces 231, $3-\frac{2}{3}$. The s faces were bright, and admitted of approximate measurement on the reflecting goniometer, giving $s \wedge s$, $231 \wedge 2\bar{3}1 = 30^\circ 40'$, calculated $31^\circ 0'$. These s faces differ from the ordinary pyrite combination, for with 210 and 021 usually 321, 132 and 213 occur in one octant, while here only one of the alternating faces 231 occurs.

All who have seen these crystals pronounce them the most curious and interesting pyrite crystals that they have ever seen. Why they have been distorted in this peculiar way I cannot venture to say. Some law must have governed them, for they all have such perfect, though lower than isometric, symmetry. It is perhaps the result of the vicinal development of the faces which is so common at the locality. If in Fig. 31, which is the ordinary isometric trigonal-trisoctahedron 332, $\frac{2}{3}$, the four r faces in front, and the corresponding ones behind were extended they would give a tetragonal pyramid like Fig. 26, except that Fig. 26 has been somewhat shortened by the curved nature of the faces. The curious forms which we have been considering I prefer to regard as abnormally developed trigonal-trisoctahedrons. That they are really isometric is proved by the occurrence of the ordinary pyrite form π (210), $\frac{1}{2}$ ($i-2$). The behavior of one of the curved crystals on the reflecting goniometer is also quite striking. Measuring from pyramid to pyramid over the vertical axis the very points gave sharp reflections of the signal, and then on turning the crystal there followed an unbroken band of light, with no sharp reflection of the signal, as long as different parts of the curved surfaces were in a position to reflect the light. The angle between the sharp reflections of the signal, obtained from the very minute flat surfaces at the points, was found to be $109^\circ 36'$, calculated for $o \wedge o$ ($111 \wedge \bar{1}\bar{1}1$) $109^\circ 28'$. We see from this that our steep $\frac{2}{3}$ pyramid at the base, becomes by the curving gradually flatter till it corresponds to a unit pyramid or octahedron at the vertex.

The specific gravity of two of the crystals, represented in Figs. 26 and 28, was found to be 5.016 and 5.022 respectively.

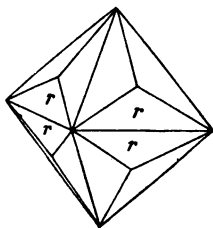
MINERALOGICAL LABORATORY, SHEFFIELD SCIENTIFIC SCHOOL,
December 18th, 1888.

Additional Note.—Very recently Mr. George L. English of Philadelphia sent me a suite of French Creek pyrites . . . containing six of the elongated pyramids, mostly of the Fig. 28 type, also a number of cube octahedron and pyritohedron combinations which are modified and

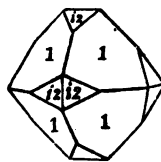
rounded by the occurrence of vicinal faces and one crystal, forming a sort of connecting link between an octahedron and the Fig. 26 type, where the octahedron and some trigonal trisoctahedral faces round off and blunt the apex of the pyramid. He also informs me that the isolated crystals occur imbedded in calcite.

S. L. P.

Several other interesting forms, beside the above described, occur at the French Creek mines. One of these is shown in Fig. 32. The demand



No. 31.



No. 32.

for all these modified octahedrons is far greater than the supply. It is only occasionally that we are able to secure one or two of them. If our customers will kindly file their orders with us we will endeavor to supply them. Prices \$1.00 to \$7.50. Bright, regular octahedrons, 5c. to \$2.50.

French Creek Chalcopyrite.

The crystallized chalcopyrite of the French Creek Mines, in Chester Co., Pa., has long been well known to collectors of fine minerals. The crystals are mostly on a base of the same mineral, more or less mixed with pyrite, magnetite and amphibole. The crystals occur completely imbedded in a calcite, rendered green by the multitude of crystals of byssolite embedded in it. This is dissolved off with acid, leaving the crystals of the copper pyrites in beautiful groups, having a very rich and varying iridescence, blue and copper-red colors predominating. We have bought all the specimens obtainable direct from the mines, and our prices have always been low, 50c. to \$2.50 for large drawer specimens, \$2.50 to \$7.50 for shelf and museum specimens. Recently some remarkably sharp, detached crystals of interesting forms have been sent us. A paper on these crystals by Professor Penfield will shortly appear in the *American Journal of Science*. Prices 5c. to 50c. each.

Rutile, N. C.

The rutile crystals from Alexander Co., North Carolina, of which we have a large stock, are worthy of especial notice. They have a brilliant sub-metallic lustre, and a very high polish. The color is ordinarily iron-

black, but generally a rich ruby-red by transmitted light. Several planes new to the species have been described (see *A. J. S.*, June, '87), and the complex modifications common to the crystals from this locality give them unusual interest. The average size of the crystals is about $\frac{3}{16}$ inch thick by one inch long. Choice specimens will be furnished at 10c. to 50c. each.

Arkansas Minerals.

Mr. Niven has visited the well-known Arkansas localities three times, and we also sent our collector there last September. We have, therefore, a splendid stock of *all* the desirable minerals from this region.

Quartz Crystals, extra good, 10 cents to \$5.00.

Aegirite, splendid, terminated crystals, some of them as much as ten or twelve inches long, 25 cents to \$10.00

Wavellite, excellently crystallized, 10 cents to \$2.50.

Variscite, choice, 10 cents to \$1.00.

Rutile, geniculated, extra good, 10 cents to \$2.50.

Rutile paramorphs after Brookite, very fine, 25 cents to \$5.00.

Brookite, brilliant crystals, loose and on the gangue, the finest ever in the market, 10 cents to \$10.00.

Perovskite, choice crystals, 10 cents to \$2.00.

Eudialyte was first recognized a number of years ago by Sheppard, and since then has been lost sight of until Mr. Niven visited the locality. It occurs of a very beautiful pink color, and occasionally in good crystals. Specimens, 25 cents to \$5.00.

Lodestone, very strong, 10 cents to \$1.00.

Elaeolite, 5 cents to 50 cents.

Yttria and Thoria Minerals from Texas.

An elaborate paper, by W. E. Hidden and J. B. Mackintosh, on the rare minerals recently discovered in Llano Co., Texas, appeared in the *American Journal of Science*, December, 1889.

Yttrialite is a new thorium-yttrium silicate, occurring only massive, of a dark olive-green color. Specimens, 25 cents to \$5.00.

Thoro-Gummite is a new hydrated uranium thoro-silicate, of a dull yellowish-brown, generally massive, though a few groups of zircon-shaped crystals were found. But one kilo of this species has been secured. Specimens, 50 cents to \$5.00.

Nivenite is a new hydrated thorium-yttrium-lead uranate. Only a very small quantity has been found, it occurring massive, of a velvet-black color. One cubical crystal has been found. Specimens, 50 cents to \$5.00.

Fergusonite, in two distinct varieties, designated "mono-hydrated," and "tri-hydrated," have been described. Good crystals, \$1.00 to \$5.00; massive specimens 25 cents to \$2.00.

Gadolinite has been found in large quantities in Texas, and some

crystals of enormous size (up to sixty pounds) were found. The material is almost invariably superficially altered into a reddish-brown mineral. Specimens, 25 cents to \$5.00. Museum specimens, \$10.00 to \$25.00.

Allanite, of a beautiful, shining, pitchy-black appearance, occurs rather sparingly in masses. This is an exceptionally attractive variety. Specimens, 25 cents to \$1.00.

Cyrtolite has been found abundantly, both massive and in good crystals. Specimens, 25 cents to \$3.50.

Tengerite, the very rare carbonate of yttrium, occurs sparingly in the cracks and fissures of the Gadolinite and Yttrialite. Specimens, 50 cents to \$2.50.

Gummite is also associated with the other rare minerals of this interesting region. Specimens, 50 cents to \$2.50.

Other associated minerals are Molybdenite, Molybdite, Fluorite, Smoky Quartz Crystals, Hyalite, Orthoclase in good crystals, Albite Biotite (?), Muscovite, Magnetite, and Martite.

As Mr. English visited these Texas localities in February, 1889, and as Mr. Niven has made three visits and devoted some two months' time to developing them, we have a large stock of specimens.

A pamphlet giving the full paper of Hidden and Mackintosh will be sent free to all customers who wish it.

Mexican Minerals.

Mr. Niven visited Mexico during the summer of 1889, and he will devote the coming summer to another and much more extensive visit to these excellent localities, and we are anticipating great results from his trip.

Topaz crystals from San Luis Potosi were secured in large numbers and of great brilliancy and beauty. The crystals are generally small, averaging about half an inch in length, but some which Mr. Niven secured were as much as $1\frac{1}{2}$ inches long by $\frac{1}{4}$ inch in diameter, and of a delicate light wine-yellow color. We have a very large and fine stock, both of loose crystals and gangue specimens, at 10 cents to \$10.00.

Calcite and *Amethyst* from Guanajuato, are very richly represented in our stock, 10 cents to \$3.50 being average prices.

Apophyllite from Guanajuato, in magnificent specimens, has been so popular that no specimens remain. We hope to secure a fine lot ere long.

Opals, of all kinds, 10 cents to \$5.00.

Native Iron Sulphates from Chili.

We have a good stock of the rare minerals *Amarantite*, *Roemerite*, *Copiapite*, and *Coquimbite*.

Amarantite, a recently described species, occurs in microscopic crystals of a rich orange-red color associated with Copiapite. The analysis by Frenzel gave SO_3 , 37.26; Fe_2O_3 , 35.58; H_2O , 27.62 = 100.46, leading to the formula $\text{Fe}_2\text{O}_3, 2\text{SO}_3 + 7\text{H}_2\text{O}$. Specimens 25 cents to \$2.00.

Roemerite occurs mostly massive or crystalline, of a dark brown color. Specimens, 25 cents to \$1.50.

Copiapite is massive and of a light yellow color. Specimens, 10 cents to \$1.00.

Coquimbite occurs well crystallized, but usually massive, of an amethystine color. Specimens, 25 cents to \$2.00.

Native Copper Pseudomorphs after Azurite.

Prof. Wm. S. Yeates, in the *American Journal of Science*, November, 1889, describes this most curious occurrence of copper from near Georgetown, New Mexico, popularly known as "copper balls." These aggregates are found imbedded in kaolin. Upon removing this with a knife or a sharp pointed instrument, the bright surface of the copper is revealed. Those who are familiar with the balls of Azurite crystals from Chessy, France, or Morenci, Arizona, would be at once struck with the similarity of these copper formations. The specific gravity of the copper is very low (4.15), and it is very brittle. "An examination of the fresh fracture with a lens showed that the kaolin not only coated the surface, but that it was intimately mixed with the copper-like particles, producing a granular fracture, and giving rise to the stippling on the crystal surfaces. A fragment under the pestle in an agate mortar was reduced to powder, the metallic grains, which had been proved before the blowpipe to be copper, segregating together, and marking the mortar and pestle with bright, shining streaks. The copper being so finely divided, it was now clear why the specimen was brittle and why it had so low specific gravity. If the copper was, as it appeared to be, a pseudomorph after azurite, the latter must have lost its carbonic acid and water in the presence of some reducing agent, probably volcanic gases thrown up from below, leaving the copper in a spongy state, upon which the kaolin was deposited, and forced by pressure while in a soft, semi-liquid condition into the pores of the sponge."

We have a large stock of these most interesting pseudomorphs. Prices, 50 cents to \$2.50, with the kaolin well cleared off, or 25 cents to \$1.50 for the "balls" covered with kaolin.

Descloizite from Georgetown, New Mexico.

Descloizite occurs in all of the fifteen mines on Parapet Mountain, Grant County, New Mexico. In June 1887, Dr. F. A. Genth announced the occurrence of a vanadate of lead in the McGregor Mine, one of the group now owned by the Mimbres Consolidated Mining Co. Dr. W. F.

Hillebrand (*American Journal Science*, June, 1889) describes the occurrence of descloizite in the Commercial Mine, Georgetown, and gives the following analysis:

PbO	56.01
CuO	1.05
FeO	0.07
ZnO	17.73
V ₂ O ₅	20.44
As ₂ O ₅	0.94
P ₂ O ₅	0.26
H ₂ O	2.45
Cl	0.04
SiO ₂	1.01
CaO	0.04
MgO	0.03
	<hr/>
	100.07

Dr. Hillebrand says, "This is one of the most interesting occurrences of descloizite known, because of the extreme brilliancy of coloring of the mineral. . . . In places where the rock is most fractured and crushed the descloizite appears in greatest quantity and finest condition as an incrustation on quartz, often covering large surfaces, and in color varying from yellow through all shades of orange-red to deep reddish brown, the last-named colors predominating. The black color so frequent in descloizite from Lake Valley, New Mexico, caused by a superficial coating or admixture of pyrolusite, is, so far as my observation extended, wanting, hence specimens from Georgetown are likely to be much sought after for their showy appearance."

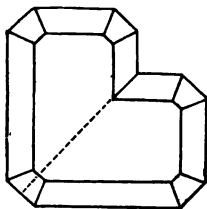
Since the above was written many specimens incomparably finer than those which furnished the basis of the above description have reached us direct from the mines, as the result of Mr. English's visit in April, 1889. The crystals are commonly closely aggregated in globular forms, and on many specimens they are clearly pseudomorphs after vanadinite, retaining the hexagonal form, while in others they appear to be stalactitic. In the latter form the crystals attain their largest size, occasionally measuring as much as one-eighth of an inch. Very rarely, isolated crystals of small size may be found scattered over the rock. They appear to be very simple tabular rhombs. The brilliant polish of the crystals, and the rich, gorgeous colors give to the specimens a sparkle and beauty never before seen in this rare species.

Bright little rhombs of calcite are frequently scattered over the descloizite; wulfenite in small orange-yellow crystals is occasionally to be

seen, especially on such specimens as contain cerussite and embolite, which last-named mineral is the chief silver ore of the mines and occurs in very rich and sharply crystallized specimens. The most common associate of the descloizite, however, is vanadinite. It occurs in regular hexagonal prisms, but more commonly in curved or barrel-shaped crystals similar to those of the Big Bug district in Yavapai County, Arizona. Some of these crystals also show a curious hollowing out. The superficial colors of the vanadinite are almost always either white, gray, or brown; but by transmitted light all of the specimens have a clear honey-yellow color. Crystalline sheets, showing on one side distinctly crystallized vanadinite, and on the other descloizite, are among the other interesting novelties of this locality. The enthusiastic reception which has been given these minerals warrants us in commending them to our customers. We can supply *extra fine* specimens, averaging 1x1 inches, for 10 to 25 cents; 2x3 inches, 50 cents to \$2.50; 3x4 inches, \$1.00 to \$3.50. Shelf and museum specimens, \$3.50 to \$15.00.

Red Wulfenite from Arizona

Was first noticed in 1881, by B. Silliman,¹ and since described by Koch,² and later by W. B. Smith.³ From the Red Cloud Mine by far the finest specimens known have been taken. "They show very solid tabular crystals of large size, brilliant lustre, and rich orange-yellow to orange-red color. The color at once suggests the presence of vanadic acid, like the well-known specimens from Wheatley Mines, as detected by Smith, but I have not found a trace of vanadic acid in these Red Cloud or other Arizona wulfenites."—*Silliman*.



No. 33.

The accompanying figure represents one of the twin crystals described by W. B. Smith. "They are composed of two rectangular tablets united by the prism ∞P , and produce a form bent at an angle of 90° , as shown in Fig. 33. Pyramids of the second order predominate, those of the first order are subordinate, and the base, OP , is rare. Koch did not find it on specimens he examined, but instead a very low pyramid of the second order, very common on crystals of this lot, which he refers to $\frac{1}{2}\frac{1}{4}P\infty$." We have had large numbers of superb specimens of the Red Cloud wulfenites in stock as the result of Mr. English's visit to the mine. Loose crystals, 10 cents to \$2.00; choice gangue specimens, 25 cents to \$10.00.

In the Melissa Mine, about a mile from the Red Cloud Mine, occur fine red wulfenites, generally, however, smaller and of a lighter orange

¹ *Amer. Jour. Sc.*, III., Vol. XXII., Sept., 1881.

² *Zeitschrift für Kryst. und Min.*, VI., 1882, p. 397.

Proc. Colo. Sc. Soc., Vol. II., p. 162, 1887.

color than those of the Red Cloud Mine. We secured quite a large number of very interesting crystals, with basal plane very much reduced, and in some cases entirely wanting, giving the crystals an octahedral habit. These rare crystals commonly measure about one-fourth of an inch in each direction.

Specimens from the Melissa Mine, 25 cents to \$2.00.

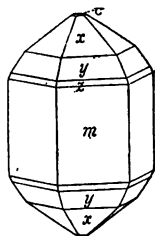
Vanadinite in Arizona.

The first mention of the occurrence of Vanadinite in Arizona was made by B. Silliman, in the *American Journal of Science*, September, 1881. He described the occurrence of the mineral in several of the mines in the "Silver District," and also in the "Vulture District," in the latter of which Crocoite, Vauquelinite, Phenicochroite, Jossaite (?), Volborthite (?), Descloizite, Chileite (?), Mimetite, and Wulfenite are also found. Subsequent papers on Arizona Vanadinite have appeared as follows: W. P. Blake (*A. J. S.*, Nov., '81), on the occurrence in the Castle Dome District, Arizona; F. H. Blake (*A. J. S.*, Aug., '84), on the occurrence in Pinal County, Arizona; S. L. Penfield (*A. J. S.*, Dec. '86), on the occurrence in Pinal County, Arizona and Lake Valley, New Mexico (Endlichite); W. B. Smith (*Proc. Colo. Sc. Soc.*, April, '87), on the occurrence in Yuma County, Arizona.

The specimens from the Hamburg and other neighboring mines in the Silver District, Yuma County, are unquestionably the most beautiful Vanadinites in the world. Mr. English visited this district in May, 1889, and secured by far the largest and most varied lot of specimens ever shipped from Yuma County. The whole district is now deserted, none of the mines having proved profitable, and it, therefore, seems probable that no additional specimens will come into the market, unless the mining be carried on solely for the Vanadinite, which would be so expensive as to compel a very material increase in the price. Our prices for choice specimens of this beautiful mineral will be found remarkably low.—The Yuma County crystals occur of various rich shades of yellow, orange, and red; the most common form is the hexagonal prism, with one or two planes beveling each terminal edge, and occasionally with planes replacing the terminal angles, though at times very much more highly modified crystals are noted. The crystals are ordinarily implanted singly on a siliceous, or, more rarely, a cleavable calcite rock. Occasionally doubly-terminated crystals are laterally attached to small quartz crystals, forming very attractive specimens for the microscope.

The Vanadinite from Pinal County, most admirably described by Prof. Penfield, is less beautiful than that of Yuma County. Mr. English took a trip in a wagon to the mines of the "White Picacho District" (Silliman's "Vulture District") in April, 1889, in company with their

owner, the road leading for some sixty miles over an uninhabited desert, with no water for thirty miles. The material secured was scanty, sufficient, however, to enable us to supply our customers with average specimens. The Vanadinite of this district varies greatly in color, form, and occurrence. The Phoenix Mine yields mostly short, stout prisms, similar in the main to Fig. 34, and of a dark orange or red color. In the Collateral Mine the mineral is much less regular in form, though generally quite acicular, and of a light yellow color, sometimes enclosed in a clear calcite.



No. 34.

As already noted, our stock of Vanadinite is very large. Choice specimens an inch square can be purchased as low as 10 cents. Average sizes, 25 cents to \$2.00. Larger, \$2.50 to \$25.00.

Other Arizona Minerals.

Azurite, Arizona.—The finest azurites from any locality in the world (not even excepting Chessy) have been recently secured from the celebrated Copper Queen Mine at Bisbee. Both in size, perfection and brilliancy, they are unsurpassed. As we have personally visited the locality, and as one of our own collectors is constantly on the alert for the best Arizona minerals, we have been able to secure a few of the most remarkable crystals, and large numbers of exceedingly beautiful groups of smaller crystals. The finest crystals brought \$10.00, but as our prices for Arizona specimens are very much lower than those asked for the Chessy specimens, our customers will find Arizona groups at \$2.50 as good as \$10.00 Chessy specimens. Choice crystallized azurite specimens 10 cents to \$10.00. A lot of very fine pseudomorphs and partial pseudomorphs of malachite after azurite were secured recently from Morenci, prices 50 cents to \$5.00; also a few complete balls of azurite crystals, 25 cents to \$1.50.

Malachite, Arizona.—At Bisbee we secured a lot of superb velvet malachites, and light masses composed of aggregations of rich glossy tufts of crystals, the most beautiful we have ever seen. A few specimens still remain at 25 cents to \$2.00; museum specimens \$5.00 to \$10.00. We have also a good stock of the stalactitic malachite and azurite from Morenci, polished to show the beautiful banding of green and blue, 25 cents to \$2.50.

Chrysocolla, Arizona.—From Morenci, Bisbee, Globe and other places in Arizona, we have good specimens of Chrysocolla. The Bisbee specimens are made up of layers of botryoidal masses of a very light blue color and have been quite popular. 10 cents to \$1.50.

Cuprite, Arizona.—Bisbee has so far produced the finest groups of large cuprite crystals of any American locality, a few of them being fully as good as the best Cornish specimens, though the average specimens

(10 cents to \$1.00) are scarcely so good. Several localities for chalcotrichite have been noted in our collecting tours, but so little has been secured that none is at present in stock. One mine at Morenci has produced a few incomparably fine specimens. As we are constantly securing new lots of minerals from Arizona, it is quite possible that we may be able to supply our customers with such specimens, and we, therefore, recommend them to file their orders with us.

For Lettsomite from Arizona, see page 43.

Japanese Topaz and Orthoclase.

Topaz.—Quite a large number of fine crystals of Topaz have been imported by us, two shipments having been received direct from Japan. The crystals vary greatly in form, the last shipment containing a large number of colorless, prismatic crystals, averaging about $\frac{1}{2}$ inch in length by $\frac{1}{4}$ inch in diameter, and many of them with highly modified terminations. Crystals strongly resembling the magnificent specimens from the Adun-Tschillon Mountains, Siberia, and measuring as much as 2 $\frac{1}{2}$ inches, have been received by us. Many of these large crystals are unfortunately water-worn. Their colors vary from a pale aquamarine blue through light green shades to the perfectly colorless. Three or four of the largest crystals show a very pale pink color near the edge, and a blue centre. The finest crystals average about half an inch to an inch and a half in size, are colorless, transparent, and have highly modified terminations. Two of the terminal planes are sometimes curiously etched and serrated, while two or occasionally four similar planes are roughened. We have a fine stock of these new and interesting crystals. Prices of good crystals 25 cents to \$10.00. Cleavages, 5 cents to 25 cents.

Orthoclase.—We would call especial attention to the superior excellence of the crystals of orthoclase from Japan. They are sharply defined and present not only single crystals but excellent twins of both the Baveno and Carlsbad types. The crystals vary in size from an inch to four inches, averaging about 2 in. Our prices range from 10 cents to \$2.00.

Alaska Garnets.

The beautiful red Almandite garnets from Alaska (represented in Fig. 35) are always popular. They occur in truncated rhombic dodecahedrons imbedded in a hard mica schist. We have a large and choice stock. Loose crystals, 10 cents to \$1.00; gangue specimens, 10 cents to \$5.00.

Ulexite from Nevada.

We have in stock exceedingly choice specimens of this rare mineral, showing the long silky fibres so characteristic of the species. Prices, 25 cents to \$1.50. Analysis by J. E. Whitfield of the United States

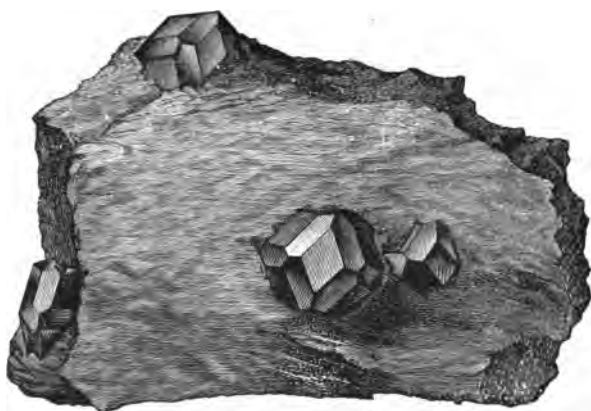
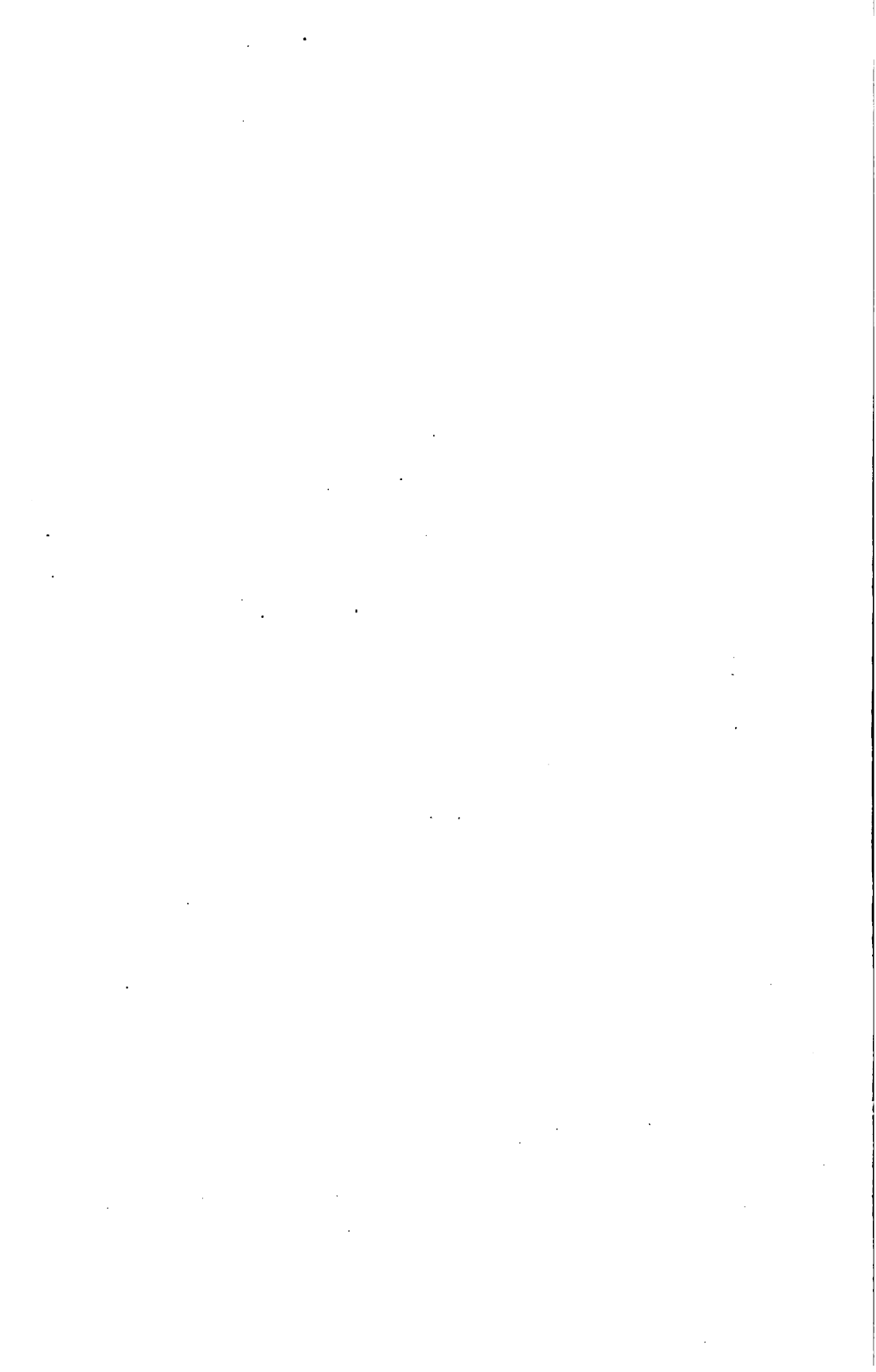


FIG. 35.

ALMANDITE GARNETS
IN MICA SCHIST,
NEAR FORT WRANGLE, ALASKA.



Geological Survey, of material from the same locality (*American Journal Science*, October, 1887), is as follows:

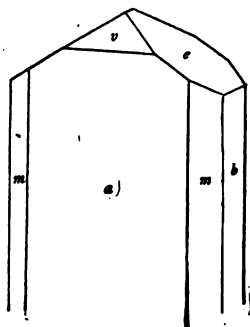
		Calculated Composition.
SiO ₂	0.04	
Cl	2.38	
B ₂ O ₃	43.20	45.34
SO ₃	0.28	
CaO	14.52	15.04
Na ₂ O	10.20	8.83
K ₂ O	0.44	
H ₂ O	29.46	30.79
	<hr/> 100.52	<hr/> 100.00
Deduct O for Cl . . . .	.53	
	<hr/> 99.99	

Copper Arsenates, etc., from Utah.

The occurrence of a number of the rare copper arsenates in the Tintic District, Utah, was first announced by Mr. Richard Pearce to the Colorado Scientific Society, in April, 1884. Considerable work has since been done on the group by Mr. Pearce, Dr. W. F. Hillebrand and H. S. Washington, the results of which have been published in the *Proc. Colo. Sc. Soc.* and *Bulletin No. 20, U. S. Geological Survey*. The group is one possessing many most interesting features, especially in the chemical relations of the species. As a rule the crystals are small, and, therefore, superb microscopic mounts of many of the species below enumerated have been secured. [See List of Microscopic Mounts on p 17.]

Olivinite occurs in good crystals of olive-green and brownish-yellow colors. Acicular crystals are by far the most common, and generally their form is very simple, even the planes b ($010, i-\bar{i}$), and v ($101, i-\bar{i}$), in Fig. 36, being, as a rule, absent or at least quite minute. The much rarer tabular form of Olivinite occurs very sparingly in the Tintic District. A third compact fibrous variety corresponds to the "wood-copper" of the Cornish miners. [Specimens of Olivinite, 25 cents to \$1.50.]

Erinite is one of the rarest of the group in the Tintic District. In the published descriptions it is mentioned as a "dark-green crystalline lining of cavities." We have since secured the species in quite distinct crystals, and it is probable that ere long erinite may be accorded a place among the other crystallized species of the group. As a rule the mineral shows a rich



No. 36.

atiny sheen, due to reflection from exceedingly minute crystal facets. This characteristic, and its ordinarily darker color, generally serve to distinguish it from conichalcite, which it often much resembles. Stalactitic forms are quite common, and also pseudomorphs after Olivenite and Azurite. Analyses of the Utah Erinite are as follows:

	I.	II.	III.	
	Hillebrand.		Pearce.	
			a	b
CuO	57.67	57.51	56.56	57.43
ZnO	1.06	0.59	. .	. .
CaO	0.32	0.51	0.43	. .
MgO	tr.	tr.	. .	. .
As ₂ O ₅	33.53	31.91	32.07	32.54
P ₂ O ₅	0.10	. .	. .	. .
H ₂ O	7.22	9.15	6.86	7.67
Fe ₂ O ₃	0.14	0.20	0.85	. .
SO ₃ . . . . .	. .	. .	tr.	. .
	<u>100.04</u>	<u>99.87</u>	<u>96.77</u>	<u>97.64</u>

[Specimens of Erinite, 25 cents to \$2.00.]

Conichalcite occurs in the form of beautiful emerald-green spheres, averaging three-fourths of a millimeter in diameter, and showing when broken a radiated structure. Very commonly these little globules are closely aggregated, sometimes completely covering large surfaces of the rock. Like erinite, conichalcite is also found in stalactites and pseudomorphs. Analysis by Hillebrand shows: CuO, 28.68; CaO, 19.79; MgO, 0.54; ZnO, 2.86; Ag, 0.30; As₂O₅, 39.94; P₂O₅, 0.14; H₂O, 5.52; Fe₂O₃, 0.36; CO₂ (by difference), 0.97; Quartz, 0.90 = 100.00.

"Heated in any manner before the blowpipe, most violent decrepitation ensues, the entire fragment flying into fine powder. In a closed tube, after decrepitation has ceased, the particles, by gently tapping, may be made to collect at the bottom as a brown-black spongy mass of great volume. This collected on a loop of platinum wire fuses before the blowpipe, at first with a pale-bluish coloration of the flame."

[It is a beautiful mineral under the microscope, and we commend our mounts of it most confidently. Cabinet Specimens, 25 cents to \$2.00.]

Tyrolite is the most abundant of the Utah copper arsenates, but crystallized specimens of it are *exceedingly* scarce. It ordinarily occurs as a thin, foliaceous coating of a more or less radiated structure, on a hard quartz rock. It has a bright green color, sometimes of a bluish cast, and its lustre is pearly. The identity of the Utah mineral with Tyrolite is not yet fully established, a query being placed after the name in the published description. If we mistake not, however, no crystallized specimens had been found when it was described, and it is probable that examination of

the pure crystals which we collected in June, '89, will lead to positive results. The analyses are as follows:

	I.		II.	III.
	<i>a</i>	<i>b</i>	Hillebrand. Mean.	Pearce.
CuO . .	45.20	45.23	45.22	46.38
ZnO		0.04	0.04	tr.
CaO . .	6.86	6.82	6.84	6.69
MgO . .	0.05	. .	0.05	0.04
As ₂ O ₅ .	28.84	28.73	28.78	26.22
P ₂ O ₅ . .	tr.	. .	tr.	tr.
H ₂ O . .	17.26	. .	17.26	17.57
SO ₃ . .	?	?	?	2.27
	98.21		98.19	99.17
				99.22

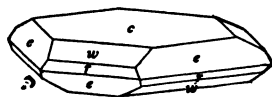
Assuming that SO₃ was present as gypsum, the following molecular ratios are obtained:

	CuO (CaO)		As ₂ O ₅		H ₂ O
I.	5.00	:	0.94	:	6.80
II.	5.00	:	0.84	:	6.81
III.	5.00	:	0.90	:	6.29

The As₂O₅ is somewhat less, and the H₂O much too low to satisfy Von Kobell's formula for tyrolite, viz., 5CuO, As₂O₅, 9H₂O. A large portion of the water in tyrolite is so loosely combined that Church considers its correct formula as 5CuO, As₂O₅, 4H₂O, he claiming that much of the water shown by the analyses is hygroscopic water included between the plates of the mineral. Hillebrand states that but *three* molecules of water are *firmly* combined in the Utah mineral. It is quite possible that future work may entirely change the theoretical composition of the European tyrolite, and separate the Utah mineral as a distinct species.

Specimens, 25 cents to \$2.00.

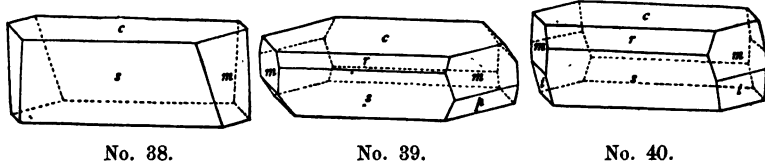
Chalcophyllite is by far the rarest of the Utah arsenates, for though Mr. English has visited the localities three times, but two inferior specimens were secured by him. While no analyses of this species have been made for want of sufficient material, the accompanying figure (No. 37) will illustrate the form of the crystals, which occur in rosettes of small hexagonal plates, several planes replacing the edges.



No. 37.

Clinoclaseite is possibly the most beautiful of all the Tintic minerals, and the best specimens of it which we secured are not in any way inferior to the best English specimens. The crystals are exceedingly brilliant,

have the characteristic rich dark-blue color, appearing almost black by reflected light. The mineral occurs in two distinct types; the first in distinct crystals, which are represented in Figs. 38, 39, 40; the second in globular forms. The crystals are simple, the usual form being that shown in Fig. 38, or a combination of it with *r*. The planes *p* and



No. 38.

No. 39.

No. 40.

shown in Figs. 39 and 40 as partially replacing *m*, are new to the species. The second or globular type of Clinoclasite is due to the nearly parallel growth of the crystals. "In some of the specimens the crystals are grouped about the *b* axis, with *c* exposed. They are inclined a trifle in the zone *cb*, and also in the zone *ab*, thus rounding off the group in two directions, but decidedly more in the latter zone, forming, with the elongation in the direction of *b*, distinctly barrel-shaped forms. Occasionally the curvature in the zone *cb* is carried still further, producing globular forms. In all cases *c* forms the outer surface, and the crystals are closely crowded together, producing a bright and coarsely rough surface." The analyses (by Hillebrand) of the Utah Clinoclasite approximate quite closely to the theoretical composition.

Specimens, 25 cents to \$2.00.

Chenevixite occurs in irregular masses of an olive-green to yellowish color scattered through some portions of the Tintic ores. Analysis by Hillebrand is as follows:

		Chenevixite from Cornwall.
CuO	26.31	31.70
CaO	0.44	0.34
MgO	0.16	..
Fe ₂ O ₃	27.37	25.10
Al ₂ O ₃	0.66	..
As ₂ O ₃	35.14	32.20
P ₂ O ₅	..	2.30
H ₂ O	9.33	8.66
Quartz	0.40	..
	99.80	100.30

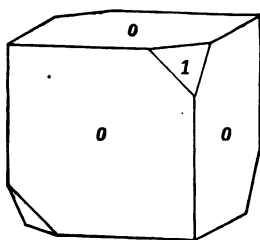
Mixite (or a closely related species) occurs sparingly in the Tintic District, in very fine silky tufts of white to greenish-white acicular crystals. The analyses are as follows:

		I. Hillebrand. b	Mean.	II. Pearce.	III. Schrauf. Mixite of Joachimsthal.
CuO	43.89	43.88	43.89	50.50	43.21
ZnO	2.79	2.62	2.70	. . .	. . .
CaO	0.26	0.26	0.26	3.19	0.83
Bi ₂ O ₃ . . .	11.14	11.22	11.18	. . .	13.07
As ₂ O ₅ . . .	27.78	28.79	28.79	27.50	30.45
P ₂ O ₅	0.06	. . .	0.06	. . .	
H ₂ O	11.04	11.04	11.04	12.55	11.07
SiO ₂	0.36	0.48	0.42	. . .	. . .
Fe ₂ O ₃ . . .	0.97	. . .	0.97	. . .	1.52 (FeO)
	<u>98.29</u>	<u>98.29</u>	<u>99.31</u>	<u>93.74</u>	<u>100.15</u>

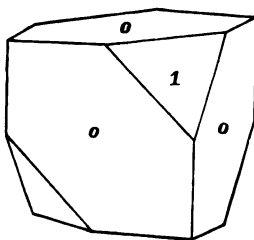
The foregoing analyses of the Utah mineral show a close relationship between it and the mixite of Joachimsthal, "but the form of this mineral as given by Schrauf differs from that of the present one, and its color is given as emerald to bluish green. Schrauf's number for the specific gravity (2.66) is unquestionably much too low. That of the material now analyzed was 3.79 at 23½° C. When treated with nitric acid it becomes at once covered with the brilliant white coating of bismuth arseniate so characteristic of mixite. The latter mineral is stated to belong to the monoclinic or the triclinic system, while the observations of Mr. Whitman Cross would indicate that the present one can belong to neither of those systems. He says, 'The needles are very slender, with a length of more than 1 mm. in some cases, by 0.5 mm. They are deeply striated vertically, and the crystal system could not be determined, although the extinction in polarized light makes reference to the tetragonal, the hexagonal, or the rhombic system necessary. The index of refraction is high, pleochroism distinct, the colors observed being for the thicker crystals, *a* (and *b*) sea green, *c* sky blue.'

A few specimens are in stock at 50 cents to \$4.00.

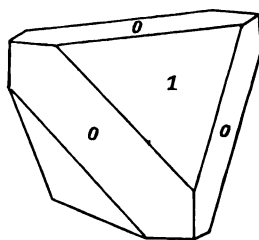
Pharmacosiderite, from Utah, has been described by Mr. Pearce.



No. 41.



No. 42.



No. 43.

"The varieties of color observed in the crystals of the Utah mineral are, straw-yellow, amber-yellow, yellowish-brown, brown, pale-green, apple-

green and leek-green, varying from transparent to translucent and opaque. The crystals are either cubes without any modification, or show the usual tetrahedral development of O, modified in different degrees by I., with the characteristic diagonal striae well-marked in some specimens." The accompanying figures illustrate the observed forms. "The exact chemical composition of the Utah pharmacosiderite has not yet been investigated, owing to lack of sufficient material, the mineral occurring very sparingly."

A few specimens are in stock at 50 cents to \$1.00.

Scorodite has been found rather plentifully in the Tintic District by Mr. English, though no description of its occurrence there has been published. It has the characteristic pale leek-green color, and though the crystals are commonly very small a few specimens show quite large crystals.

Specimens, 25 cents to \$2.00.

Enargite, as Mr. Pearce aptly says, is the "mother mineral" of most of the above named arsenates. It occurs massive quite abundantly in several of the mines of the district. A few small crystals have been noticed.

Good massive specimens, 10 cents to \$1.00.

Jarosite from Utah.

By Dr. F. A. Genth. [From the *American Journal of Science*, January, 1890.]

Messrs. George L. English & Co. have recently brought from the Mammoth Mine, Tintic District, Utah, interesting varieties of Jarosite in minute crystals, lining cavities of a siliceous limonite, and sometimes associated with a pulverulent, yellow mineral, probably a basic ferric sulphate. The crystals are of a yellowish brown to dark clove-brown color and a very brilliant vitreous luster; they are very small, from about 0.1 to 1 mm. in size, and look so much like cubes with tetrahedral planes, that they were mistaken for pharmacosiderite. A closer inspection, however, showed their rhombohedral forms. Prof. Samuel L. Penfield had the kindness to examine them for me, and gives the following information. 'The crystals are so rounded that they will not give distinct and satisfactory reflections. From a very small crystal I obtained $R \wedge R$ $88^{\circ} 27'$, while Naumann gives $88^{\circ} 58'$ for jarosite, an agreement as close as I could expect. I also identified the base, and a very small plane— $2R$. I was able to produce basal cleavage.'

Even the best specimens placed in my hands by Messrs. English & Co. did not furnish me with absolutely pure material for analysis, owing

to the fact that the crusts are very thin and the crystals stick so fast to the siliceous matrix and often enclose the latter, that only at the expense of a great deal of time and patience, about one gram of nearly pure fragments of crystals could be obtained (I.); analysis (II.) was made with somewhat larger and darker crystals. Both show a slight contamination with siliceous limonite—but the analyses leave no doubt that the mineral is *jarosite*. Spec. grav. of I. (taken in alcohol) = 3.163. The analyses gave:

	I.	II.
SiO ₂	0.08	0.29
Fe ₂ O ₃	50.41	51.16
Na ₂ O	9.23	0.33
K ₂ O		9.05
SO ₃	29.60	28.93
H ₂ O	10.68	10.24

[We have had a fine stock of this mineral, which was collected during Mr. English's visit to the Tintic District in June, 1889. Good specimens bring 25 cents to \$1.50.]

Lettsomite from Arizona and Utah.

Contributions to Mineralogy No. 48; by F. A. Genth. [*This paper will appear soon in the American Journal of Science.*]

Geo. L. English & Co. brought this rare mineral from two new localities, but only one specimen has been obtained at each, the Copper Mountain Mine at Morenci, Graham county, Arizona and the American Eagle or Copperopolis Mine, Tintic District, Utah. They very kindly placed all their material at my disposal which enabled me to make a fuller investigation and clear away the doubts existing as to the constitution of this mineral.

1. The Arizona mineral forms narrow seams in a siliceous gangue, coated with earthy varieties of limonite. The lettsomite occurs in thin incrustations up to a thickness of about 2 mm. In small cavities it shows thin fibres, and small tufts, often with a radiated structure. Its color is from deep sky-blue to azure-blue; lustre silky. Sp. Gr. taken in alcohol, 2.737.

Some of the lettsomite has undergone an alteration, beginning with a change into a greenish yellow, and finally, by the loss of cupric oxide, into a fibrous, yellowish white mineral. At portions, where the alteration has taken place, the matrix often shows a coating of a cryptocrystalline mammillary hydrous aluminum sulphate. The analyses were made with almost pure azure-blue tufts (*a*), and nearly pure sky-blue radiating particles (*b* and *c*).

	a.	b.	c.	Mean	Ratio	
Insoluble	0.46	0.38	0.48	0.44		
H ₂ O	12.38 }	34.47	21.89	21.89	1.216	7.8=8.
SO ₃			12.59	12.49	0.156	1.0=1.
CuO			46.39	46.71	0.590	3.8=4.
Al ₂ O ₃	15.71	16.94	16.77	16.47	0.161	} 1.0=1.
Fe ₂ O ₃	0.80	1.61	1.64	1.34	0.008	
		99.74	99.76	99.34		

Considering a slight loss of CuO by alteration the ratio for SO₃ : CuO : Al₂O₃ : H₂O=1 : 4 : 1 : 8=Cu₄Al₂[OH]₁₂. SO₄+2H₂O. This gives the following percentage composition :

Al ₂ O ₃	102	=	15.88
SO ₃	80	=	12.56
4CuO	316	=	49.23
8H ₂ O	144	=	22.43
	642		100.00

2. The lettsomite from the American Eagle Mine occurs upon a bluish green mineral which appeared to be amorphous, clay-like and evidently a mixture of clay and lettsomite. The pure lettsomite forms a velvet-like coating of azure-blue silky fibres. The specimen being very small, only 0.055 grm. could be obtained for analysis, which gave :

SO ₃	12.60
CuO	49.54
Al ₂ O ₃	15.45
Fe ₂ O ₃	0.91
H ₂ O (by diff.)	21.40
	100.00

Closely agreeing with the above composition.

Chemical Laboratory, 111 S. 10th St.,

Philadelphia, April 6, 1890.

[The Lettsomite above described was collected by Mr. English during his western tour of 1889. Though our collector visited the Arizona locality subsequently no additional material was secured, and as the mine has caved in, it is not likely that any more will come into the market. We have a few small specimens (portions of the original) at \$1.00 to \$5.00 each, and also a few good microscopic mounts.]

Utahite.

Utahite, a new mineral species, described by Arzruni, occurs sparingly in the Eureka Hill Mine; Eureka, Utah. It occurs on a very hard quartzite, forming a crystalline crust, which the microscope shows to

be composed of minute crystals. Their color is a rich yellow-brown, and their lustre silky. They have the form of tabular hexagonal prisms, with rhombohedral planes on the alternate angles. Analysis by M. Damour resulted as follows: SO_3 , 28.45; As_2O_5 , 3.19; Fe_2O_3 , 58.82; H_2O , 9.35 = 99.81. The mineral is, therefore, a hydrous sulphate of iron, the As_2O_5 being present merely because of its association with Enargite or other arsenic minerals which occur abundantly in the vicinity.

Specimens, 10c. to \$1.00.

A mineral appearing exactly like Utahite has been noticed by us on a quartz rock from the Bennett Mine, Organ Mts., New Mexico, and also associated with descloizite in the Mimbres Mines, Georgetown, N. M. We have little doubt of its identity, though Dr. Genth's partial analyses do not show an exact correspondence in composition.

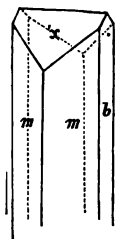
Brochantite from American Localities.

This beautiful and hitherto rare hydrous sulphate of copper is worthy of especial notice at the present time on account of its discovery at so many localities in the United States within the past few years. A brief summary of the several occurrences may not be without interest to our readers.

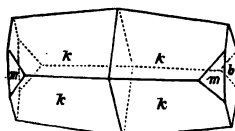
1. *Tintic District, Utah*.—Brochantite occurs but very sparingly in this locality, the first mention of it being in the *Proc. Colo. Sc. Soc.*, Nov. 1, 1886, Mr. Richard Pearce giving the following partial analysis:

CuO	H_2O	SO_3
68.7	12.44	Undetermined.

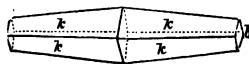
Further description by Hillebrand and Washington appears in the *Proc. Colo. Sc. Soc.*, Jan. 2, 1888. From this description we extract the following: "This hydrous sulphate of copper occurs in two distinct types in the specimens examined. The first, or ordinary brochantite, is of a pris-



No. 44.



No. 45.

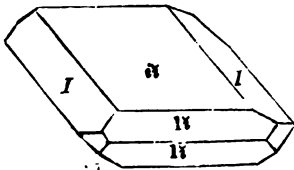


No. 46.

matic habit, as is shown in Fig. 44. The crystals are dark green and transparent, but do not give good measurements, owing to the imperfection of the surface. The cleavage parallel to b is perfect. The measured angle of $m \wedge b$, $110 \wedge 010 = 51^\circ 46'$, is only approximate, and differs considerably from Miller, who gives $52^\circ 5'$, and Schrauf, who gives 52° .

The second type is like Warringtonite from Cornwall. It is of a light green color, and has a curved, double wedge-shaped habit. The forms observed are shown in Figs. 45 and 46. The crystals were poor for measuring, all the planes, with the exception of *b*, being curved to a great degree. The crystals were none of them more than 2 or 3 mm. long, with the relative proportions of the figures. They were implanted by *b*; *m*, in Fig. 45, was identified with certainty, the angle for $b \wedge m$ being 52° approximately. The plane lettered *k* was very much curved in all cases, and its symbol, consequently, is not known with exactness."

2. *Frisco, Utah*.—During the summer of 1889, we secured from near Frisco, Utah, quite a large number of very choice specimens of Brochantite. Two different types have been observed. The first form is identical



No. 47.

with that of the Tintic District, represented in Fig. 44. On a large majority of the specimens all of the crystals have this prismatic habit. The second type is represented by Fig. 47. This is much rarer, and has been observed more especially in isolated crystals scattered over the surface of the rock, while the prismatic crystals are generally

in cavities or densely cover large surfaces of the rock. The Frisco crystals are very sharply defined, exceedingly brilliant, having highly-polished faces, and of a dark emerald-green color.

3. *Near Clifton, Arizona*.—Several mines within a few miles of Clifton have yielded fairly good specimens of Brochantite.

4. *Jerome, Arizona*.—Some fairly good specimens of Brochantite were collected by Mr. English during April, 1889, at the United Verde Mines, Jerome, Arizona. The determination rests upon partial analysis kindly made for us by Prof. Penfield.

5. *Globe, Arizona*.—A few fine specimens of Brochantite have reached us from the Globe District, but our collector, who visited the mines in November, 1889, was unable to secure any further good specimens.

Other Localities in the United States have been briefly noted in scientific journals, but the above are much the most important.

Aquamarine from Mt. Antero, Colorado.

The occurrence of gem aquamarines on Mt. Antero, Chaffee County, Colorado, was first noticed by Rev. R. T. Cross, in the *Amer. Jour. Sci.*, February, 1887. He says, "The two largest crystals found were three inches long and half an inch in thickness. Of those now in my possession eight crystals have terminations, and a dozen others are tolerably clear but

not terminated. The longest crystal is one and three-eighths inches in length and three-eighths of an inch in diameter. The lower third is translucent, the remainder transparent, with some flaws. This crystal, like the others, is finely striated on the prism, but the basal plane is very smooth and brilliant. The next crystal is very nearly the same size, is clear through its whole length, but has an imperfect termination. Another is three-fourths of an inch long, and on its termination shows the planes 2-2 quite large, and the planes 1 and 2 very small. The terminal edges of the prism of a number of the crystals are rounded; and some of them exhibit what appear to be slender longitudinal cavities running parallel to the prism, and probably due to striations on the original crystal now forming the core. This central part, or core, is often very distinct; it is transparent, while the outside layer, looked at lengthwise, is opaque. Sometimes the core projects at the broken end of the crystal in a globular form, similar to certain tourmalines described by Hamlin.

On examining the crystals closely, I found a few which had attached to them what seemed to be small quartz crystals. The angles, however, did not appear to agree with those of quartz, and knowing that phenacite was often mistaken for quartz, as its name suggests, I thought that they might be phenacites. Mr. W. Cross confirmed my supposition, and he placed the crystals in the hands of Mr. Penfield of the Sheffield Scientific School, who has fully described them."

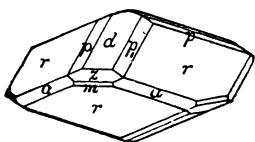
We have had many very choice crystals of the Mount Antero aquamarine in stock, at 25 cents to \$3.50 each. Just now we are entirely out of them, but we hope to secure a new lot during the coming summer, so that we shall be pleased to receive orders for them.

Phenacite from Colorado.

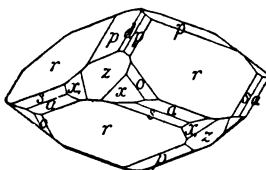
The occurrence of Phenacite in the United States was first mentioned by Messrs. Cross and Hillebrand in the *American Journal of Science*, Oct. '82. They described the lenticular crystals of the Pike's Peak region, and recorded a number of measurements of their angles. In Bulletin No. 20, U. S. Geol. Survey, the same authors described more elaborately similar, though more complex, crystals from Florissant, Colorado. Subsequent papers on the phenacite of these and adjacent localities were published in the *American Journal of Science* by Mr. W. E. Hidden and Professor S. L. Penfield.

Phenacite from Topaz Butte, Colorado.—In studying the lenticular crystals from Topaz Butte, near Florissant, "the first point noticed is their great similarity in habit to those described and figured by N. von Kokscharow, from the Ilmengebirge, Urals, where they occur with the same associations, on amazon stone. All of the forms mentioned by von Kokscharow occur on the crystals from Topaz Butte, and besides them

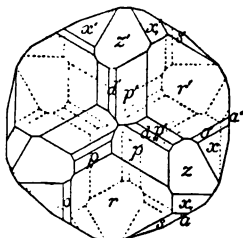
I have found no others. His figures also represent very closely the habit of the crystals. . . . All of the crystals which I have seen occurring on the feldspar are lenticular in shape, resulting from the slight development of prismatic and predominance of rhombohedral forms. Fig. 48 represents the form of crystals which occur with topaz on a brownish, lamellar albite. This specimen is in Prof. Brush's collection, labeled only Pike's Peak; the crystals are a trifle simpler than those occurring on the amazon stone from Florissant, and it may be that they are from some other special locality in the Pike's Peak region.



No. 48.



No. 49.



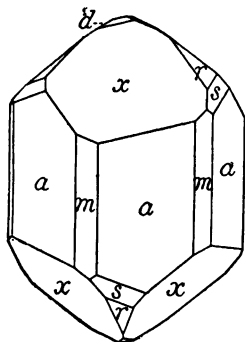
No. 50.

Here the rhombohedron r predominates, d is large, and the forms p and p_1 are, as is usually the case, about equally developed; the forms z , a and m are at times wanting, and scarcely ever more developed than shown in the figure. The crystals occurring on the amazon stone are usually more highly modified. Fig. 49 represents the forms which were observed on a crystal from Mr. C. S. Bement's collection, while Fig. 50 is a basal projection of the same with the position of the lower faces dotted in, which is well suited to show the tetartohedral character of the crystal."—Prof. S. L. Penfield, *American Journal of Science*, Feb. '87.

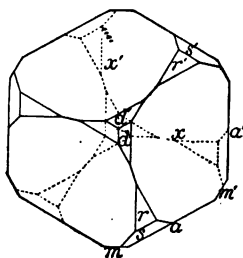
Phenacite from Mt. Antero, Colorado.—"Mt. Antero, in Chaffee Co., about one hundred miles southwest of Denver, fifty-five miles from Topaz Butte, and sixty-five miles a little to the south of west from Pike's Peak, . . . is over 14,000 feet high . . . and the phenacites were found by a prospector . . . probably at an altitude of 12,000 feet . . . So far as known the country rock is granite, and the associations are beryl, quartz and feldspar. The suite of specimens in the author's possession consists of eight specimens of pale, bluish-green aquamarine, upon three of which the crystals of phenacite are implanted. The crystals are prismatic, and the largest, about 7 mm. in length, is implanted in an inclined position upon the basal plane of the beryl, while others are scattered irregularly over the prismatic face. . . .

"The beryl crystals are deeply striated parallel to the vertical axis and eaten out, having perhaps furnished the material for the formation of the phenacite. The habit of the phenacite crystals is remarkable, and is

shown in Fig. 51 in ordinary projection, and in Fig. 52 in basal projection. In the prismatic zone the prism of the second order a prevails, while m is always small, in some cases wholly wanting. The crystals are terminated mainly by the rhombohedron of the third order x , $1\bar{3}22, -r\frac{2}{3} - \frac{2}{3}$: the unit rhombohedron r is small, and in a zone between it and the prism a is the rhombohedron of the third order s . At the top of the crystal are the three small faces of the minus rhombohedron d . The prismatic faces are striated not only vertically, especially that part of the prism farthest away from the s face, but also near each s face parallel to the intersection between s and a . These two sets of striations do not cross, but meet along



No. 51.



No. 52.

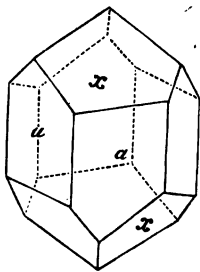
a line running in an inclined direction across the a face; the s and r faces, especially the former, are also striated parallel to the intersection between s and a . These striations point to vicinal faces, prisms and rhombohedrons of the third order, but no definite indices could be assigned to them. The x faces are not smooth and polished, but covered with little prominences, with curved, unsymmetrical contours. Crystals with exactly this habit have been previously described by Professor M. Websky of Berlin, from an unknown locality in Switzerland, and they are the only crystals, so far described, which are terminated mainly by rhombohedrons of the third order. It is interesting also to note that while in the Russian localities the crystals of phenacite occurring on amazon stone are lenticular, as is the case also in Colorado, the crystals from the emerald mines of Katharinenburg are prismatic, terminated, however, not by rhombohedrons of the third, but by those of the first and second order."—Prof. S. L. Penfield, *A. J. S.*, Feb. '87.

"The crystals are attached to quartz, transparent beryl (aquamarine, sometimes with good terminations), and Baveno twins of orthoclase, and are associated with muscovite and octahedral fluorite. All of the specimens we have seen . . . show two prominent developments. One of these . . . always occurs among those crystals which are attached to

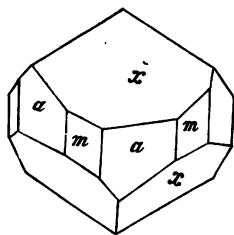
quartz or beryl, and is represented in its simplest form in Fig. 53, which shows the combination of a ($11\bar{2}0$, $i-2$) and x ($13\bar{2}2$, $-r\frac{1}{2}$ ($\frac{2}{3}-\frac{2}{3}$)), giving a very interesting form, owing to the unusual combination of a prism of the second with a rhombohedron of the third order; sometimes there are associated with these small faces of m ($10\bar{1}0$, 1), s ($21\bar{3}1$, $+r\frac{1}{2}$ ($3-\frac{2}{3}$)), r ($10\bar{1}1$, $+1$), and d ($01\bar{1}2$, $-\frac{1}{2}$) as represented in Figs. 51 and 52 of the previous communication. The second habit, which is found among those crystals which are attached to orthoclase, has two prisms well developed, and is short prismatic (Fig. 54), frequently much

shorter than represented in the illustration. Many of the crystals are of considerable size, measuring over one-half inch in diameter and one inch in length. The x faces on the larger crystals are always dull and rough, and the prismatic faces vertically striated."—Prof. S. L. Penfield, *A. J. S.*, Nov. '88.

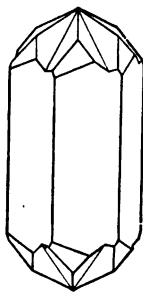
A very interesting twin crystal of phenacite from Mount Antero has very kindly been drawn expressly for us by Professor Penfield, and is represented in Fig. 55. We believe but three of these crystals have been discovered.



No. 53.



No. 54.

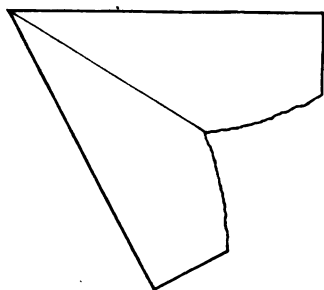


No. 55.

We have spared no effort to secure all the phenacites obtainable at the Mount Antero localities, Mr. English having visited the mountain during the summer of '88, and our Colorado collector having made three trips up the mountain, and devoted several weeks' time to thorough prospecting. As the result, we have secured many hundred choice specimens, all of the finest having passed through our hands. Specimens, with excellent prismatic crystals on beryl, orthoclase, or quartz, 50 cents to \$10.00. Loose crystals, 25 cents to \$5.00. The finest specimens sold at \$5.00 to \$25.00. We can also supply detached lenticular crystals from Florissant, at 10 cents to \$1.00 each, and gangue specimens at 50 cents to \$2.50.

Bertrandite from Mt. Antero, Colorado.

THE occurrence of this very rare mineral at the celebrated Phenacite locality on Mt. Antero, was first noticed by Mr. W. B. Smith, and the single specimen at first found was described with characteristic accuracy and minuteness of detail by Prof. S. L. Penfield in a very interesting paper in the *Amer. Jour. Sci.*, July, 1888. He says, "The crystals of Bertrandite are attached to quartz, which is associated with beryl. Other minerals occurring at the locality are phenacite, orthoclase, muscovite and fluorite. The crystals are little rectangular blades 5 mm. long, 2 mm. wide and 0.2–0.4 mm. thick. The largest faces, 5×2 mm., correspond to the basal plane of Bertrand lengthened out in the direction of the brachy-axis, \bar{a} , and marked by slight striations parallel to the shorter diameter or macro-axis, \bar{b} . Opposite this flat basal plane the crystals have a curved surface composed of the basal plane and brachydomes in oscillatory combination. The curved surface either joins the basal plane directly, forming a sharp, thin edge along the whole length of the crystal, or a narrow brachy-pinacoid is present between them. The curious development gives to the crystals a hemimorphic aspect which is very characteristic and not accidental; for all of the eight or ten crystals on the specimen were of this same character. The general shape of the crystals is that of a thin slice cut from the side of a cylinder parallel to its axis. The crystals are attached at one end, and are terminated at the free end by a macropinacoid. The observed planes are therefore the three pinacoids, one of the basal planes being rounded by oscillatory combinations parallel to the brachy-axis. The faces have a good lustre, that of the basal plane being pearly, the others vitreous. They are not well suited for measurement. There was one V-shaped twin in the specimen, the twinning plane being the brachy-dome 031 ($3-i$) of Bertrand. The flat basal planes formed the outside limbs of the V, and made an angle of $61^\circ 52'$ with one another, the curved surfaces formed the re-entrant angle. [Fig. 56 represents a cross section of a twin bertrandite projected upon the macro-pinacoid, the drawing being very kindly made for us by Prof.



No. 56.

Penfield.] Similar twins are described by Bertrand with re-entrant angle of about 60° . Two cleavages were identified, prismatic and basal, both highly perfect. . . . I cannot give a reason for the hemimorphic development of the basal plane. If Scharizer is correct in assuming that the crystals are monoclinic with the brachy-axis of Bertrand as the ortho-

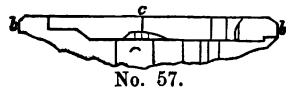
axis, such a development might result from twinning about an orthopinacoid, one basal plane being converted into a curved surface by oscillations with hemi-orthodomes, symmetrically situated on either side of the twinning plane. This would require for $\beta=90^\circ 28' 34''$ (Scharizer's value for the inclination of the a and c axes), a salient angle along the twinning line on the base of $180^\circ 57'$ which could not be detected. A section across the crystals, parallel to Scharizer's clino-pinacoid, should also show an inclined extinction, which would be especially marked along the twinning limit; a section thus prepared shows perfectly normal orthorhombic symmetry in polarized light. The optical properties point most decidedly to orthorhombic symmetry. . . . The hardness of the crystals is 6-7. They scratch feldspar readily, and with care can be made to scratch quartz, though they are apt to crush, owing to their small size and good cleavage. The specific gravity, taken with the Thoulet solution, is 2.598. . . .

By sacrificing all but one of the small crystals, and scraping off the remnants of broken crystals from the quartz, I succeeded in obtaining 0.1259 grams of material which floated on the Thoulet solution at 2.610, and sank at 2.551 sp. gr. This was subjected to a very careful chemical analysis with the following results:

	Penfield.	Damour.	Theory for $H_4Be_4Si_2O_9$.
SiO ₂	51.8	49.26	50.42
BeO	39.6	42.00	42.02
CaO	1.0	. . .	. . .
H ₂ O	8.4	6.90	7.56
Fe ₂ O ₃ . . . . .	. . .	1.40	. . .
	100.8	99.56	100.00

The analysis is satisfactory, considering the small quantity of material at my command. The BeO which was precipitated with ammonia was free from alumina, and gave the characteristic beryllium reactions. The mineral lost 0.5 per cent. by drying at 100°C. , and 1.40 per cent. at a faint red heat. The water in the analysis is too high, and probably part of it does not belong to the composition of the mineral. The microscopic sections show liquid inclusions, which are not CO₂, and are probably water, which may account for some of the excess."

In a paper in the *American Journal of Science*, March, '89, Prof. Penfield describes a new find of bertrandite at Stoneham, Maine, and adds a brief note on the Mount Antero crystals, and the accompanying figure.



No. 57.

He says: "Figure 57 represents a section across one of the Mount Antero crystals, and the accompanying figure. He says: "Figure 57 represents a section across one of the Mount Antero crystals parallel to the macropinacoid, which was drawn with a camera lucida, and magnified 17 diameters. During the past summer a number of bertrandite specimens were found, and all of them showed this peculiarity. Some of the

crystals which are now in the collection of Mr. C. S. Bement of Philadelphia [purchased from G. L. E. & Co.], are 25 mm. long, 8 mm. wide, and 3 mm. thick. That the rounding of one of the basal planes is not accidental, but is owing to a hemimorphic development of the crystals, cannot be doubted. As proof of this, one of the largest crystals was tested for pyro-electricity by the admirable method proposed by Prof A. Kundt. The crystal was heated in the air bath to 100° C., and on cooling was dusted with a mixture of red oxide of lead and sulphur. The experiment was most satisfactory; the flat basal plane showed strong positive electricity, and became coated with the yellow sulphur, while the rounded basal plane showed negative electricity, and was coated with red oxide of lead. Tests for pyro-electricity were also made on the Stoneham crystals, but they were so small that it could scarcely be determined with certainty. It seemed, however, as if the basal plane in combination with the *d* face showed positive electricity, the same as the flat basal plane of the Mount Antero crystals, while the other basal plane showed negative electricity.

"In closing, I wish to express my thanks to Messrs. George F. Kunz and C. S. Bement, who provided me with material for study, and to Mr. George L. English of Philadelphia, who sent me a large number of Mount Antero crystals for examination."

All of the crystals from Mount Antero (except the first specimen) have passed through our hands, at prices ranging from 50 cents to \$25.00. During July, '89, we sent our collector again to the locality, and he secured the largest and finest lot we have yet had, including many very excellent single and twin crystals, both loose and on a quartz-beryl gangue. We still have fine specimens, at \$1.00 to \$3.50 each. Inferior specimens, 10 cents to 75 cents.

Some other Interesting Colorado Minerals.

Loose Amethyst Crystals.—A new locality in Saguache county, Colorado, has recently yielded some curiously developed quartz crystals, the majority of which are amethystine colored at the top. The crystals average about 1½ inches long by ¾ inches in diameter, and are interesting on account of the high development of the rhombohedral planes, and the frequent occurrence of trihedral terminations, as well as in the existence of enclosed crystal cavities of nearly the form of the Herkimer crystals, and so entirely different from the form of the crystals in which they are included. These crystals have been very popular among scientific mineralogists, at 10 cents to 75 cents each.

Byssolitic Quartz Crystals.—We have secured a very fine, large lot of quartz crystals from Calumet, Colorado, in which long needles of bysso-

lite are enclosed, and also occasionally chlorite. The low prices, 10 cents to 75 cents, have been selling them rapidly.

Blue Barite, Colorado.—Over three hundred specimens have been secured from the new locality near Sterling, Colorado. All the specimens now in stock are loose, terminated crystals, a few of them doubly terminated. The color is pale blue and the average size about $\frac{1}{2} \times 2\frac{1}{2}$ inches. Prices, 10c. to \$1.50. A $1\frac{1}{2}$ inch terminated crystal, 20c.

Salida Garnets.—These very interesting crystals are invariably rhombic dodecahedrons, generally more or less distorted. The analysis of Penfield and Sperry proves that they belong to the Almandite, or iron-alumina variety. The garnets are always superficially altered to aphrosiderite, a soft ferruginous chlorite of a dark olive-green color. This mineral forms an even coating of not over an eighth of an inch in thickness, which can readily be peeled off, leaving the dark red garnet clean. The most remarkable peculiarity of the Salida garnets is their size. They average about $2\frac{1}{2}$ inches in diameter ($\frac{3}{4}$ lb.) and have been found even up to about six inches ($14\frac{3}{4}$ lbs.); they are but rarely smaller than one inch.

Zunyite is an interesting mineral described by W. F. Hillebrand in Bulletin No. 20, U. S. Geol. Survey (1885). It occurs in the Zufi Mine on Anvil Mt., near Silverton, Colorado. "A portion of the ore from this mine consists, when unaltered, of an uncrystallized sulphide of lead and arsenic, upon broken surfaces of which appear numberless projecting glassy faces of tetrahedra of the regular system . . . Their size varies from that of extreme minuteness to a diameter, in rare instances, of 5 millimeters. The smallest of the crystals are generally quite clear and transparent, but the vast majority carry more or less uncrystallized, unmagnetic, black inclusions." The luster is glassy, cleavage octahedral, hardness about 7, specific gravity about 2.9. The analyses of the purest crystals yielded Dr. Hillebrand the following results:

SiO ₂	24.33
Fe ₂ O ₃	0.20
Al ₂ O ₃	57.88
K ₂ O	0.10
Na ₂ O	0.24
Li ₂ O	trace
H ₂ O	10.89
P ₂ O ₅	0.60
F	5.61
Cl	2.91
	<hr/>
	102.76
Less O for F and Cl	3.02
	<hr/>
	99.74

From these results the following atomic ratio is deduced:

(H, K, Na)	: Si	: (Al ₂)	: (O, F, Cl)
18.00	: 6.00	: 8.00	: 45.00

giving the formula:



with part of the oxygen replaced by fluorine and chlorine.

"The Fe_2O_3 of the above analyses came undoubtedly from a thin film of ferric oxide on the tetrahedral crystals. The P_2O_5 . . . is probably derived from a small proportion of an admixed aluminum phosphate. The excess of alumina constantly found over that required for the above formula renders this the more likely." Specimens 10c, to \$1.00.

Gütermannite.—Forming the matrix of the Zunyite crystals, is a bluish gray metallic mineral which Dr. Hillebrand's analyses proved to be another new species. In composition it is essentially a sulphide of lead and arsenic, either $10PbS, 3As_2S_3$, or $3PbS, As_2S_3$.

Sperrylite.

AN exhaustive description of this new mineral species by Professors Wells and Penfield of Yale University, appeared in the *American Journal of Science* for January 1889. Few recently described minerals possess more of interest to the scientist than this. In chemical composition it is essentially a pure arsenide of platinum, represented by the symbol, $PtAs_3$, "a small portion of the platinum and arsenic being replaced respectively by rhodium and antimony." The analyses by Prof. Wells are as follows:

	I.	II.	Mean.
As . .	40.91	41.05	40.98
Sb . . .	0.42	0.59	0.50
Pt . . .	52.53	52.60	52.57
Rh . .	0.75	0.68	0.72
Pd . .	trace	trace	trace
Fe . .	0.08	0.07	0.07
SnO ₂ .	4.69	4.54	4.62
	<hr/> 99.38	<hr/> 99.53	<hr/> 99.46

The SnO_2 of the analysis is shown to be cassiterite, present as an impurity. "In composition this mineral appears to be nearer Wöhler's laurite than any other mineral now known." It occurs as a brilliant tin-white sand, intermixed with fragments of chalcopyrite, pyrrhotite, and some silicates, in pockets in decomposed masses of gold quartz at the Vermillion Mine, District of Algoma, Ontario. Its specific gravity is 10.602. Hardness between 6 and 7. Cleavage, none. Fracture, probably conchoidal. Its crystalline form Prof. Penfield says "is isometric; pyritohedral. Simple cubes are common, octahedrons are exceptional, while the majority of the crystals, which are usually fragmentary, show combinations

of cube and octahedron. . . . At first only the above mentioned forms were detected, but . . . some were detected which suggested pyrite forms. The chemical relation of the mineral PtAs_2 to the minerals of the pyrite group caused me to make a very careful search for pyritohedral forms, which was fortunately successful. Cubes with replacement of the edges are very exceptional; a number of them were found, however, and in all cases the replacements, which were necessarily small and frequently failed on some of the edges, had the arrangement required by the combination of cube and pyritohedron. The best crystal selected for measurement was the top of a cube measuring 0.35×0.45 mm. in combination with octahedron and two small but well developed pyritohedral faces. . . . Another crystal . . . was developed in all directions; in one zone the four cubic and four pyritohedral faces were all present in their proper order and gave satisfactory measurements, in a second zone four cubic and two pyritohedral faces were found and in the third zone four cubic and one truncating rhombic dodecahedral face were detected; this is the only case in which a dodecahedral (110) face was found. In a few cases the characteristic combination of octahedron and pyritohedron was detected, but the latter faces were always very small. These results are most satisfactory, and from the number of crystals which have been examined and measured, in all of which the pyritohedral faces occur with their proper order and arrangement, the hemihedral nature of the mineral cannot be doubted. Some of the crystals are somewhat rounded, and probably other isometric forms are present, but none of them were determined. . . . To sum up the crystallographic observations, the crystals usually show the combination of cube 100, $i-i$; octahedron 111, 1; pyritohedron π (210), $\frac{1}{2}$ ($i-2$) and very rarely dodecahedron 110, i . Taken in connection with the chemical results the mineral takes a place in our classification in the pyrite group where an atom of a metal, usually Fe, Co or Ni, is united with two atoms of either S, As or rarely Sb, or an isomorphous mixture of them. As this is the first time that platinum has been found in combination as a mineral it may be noted that Fe, Co and Ni and the metals of the platinum group fall in the same series in Mendelejeff's periodic system of the elements, which gives additional grounds for putting this mineral in the pyrite group." We can supply Sperrylite at \$3 per gram.

Other Canadian Minerals.

Having visited all the important Canadian localities we have a good stock of such of those minerals as are to be had.

Zircons are no longer obtainable in *fine* specimens, but we can always supply cheap student specimens at 5c. to \$1.00.

Apatite crystals average in price about as follows: One-inch crystal, one good termination, 5c. each; 2-inch, one termination, 15c.; 2-inch,

doubly terminated, 25c.; 3-inch, one termination, 20c.; 3-inch, doubly terminated, 50c.; 4-inch, one termination, 25c.; 4-inch, doubly terminated, 75c.; larger crystals, 50c. to \$1.50 each.

Titanite, good, single crystals 5c. to \$1.00; *twin* crystals, 25c. to \$2.00.

Pyroxene is in stock in exceedingly good groups of crystals at 25c. to \$4.00; small loose crystals, 5c. to 25c.

Other Canadian minerals can also be supplied at most reasonable figures, as follows: Amphibole, Biotite, Green Garnet, Molybdenite, Chrysotile, Orange Calcite, Kermesite, Scapolite, &c.

English Minerals.

We believe we can confidently claim that our various importations of English minerals have contained more choice specimens than have ever before been brought into the United States. Adhering to our policy of purchasing only *good* material, our customers will find that there are really *no poor specimens* from England in our stock. Our London agent has unequalled facilities for securing the *very best* specimens, and as his last consignment numbered over 3,000 specimens, it must be evident that our stock of English minerals is unequalled in the United States.

Egremont Calcite. We have had the best and largest of the superb twin crystals ever offered for sale in this country. The two finest crystals were sold at \$17.50 each. Choice twins can be supplied at 50c. to \$10.00. Clear, single crystals, 5c. to \$2.00; groups of clear crystals, 25c. to \$2.50. The brilliancy and beauty of these celebrated calcites can scarcely be conceived by those who are not acquainted with them.

Stank Mine Calcite, ever popular, and deservedly so, are strongly represented in our stock. The groups which are in part colored red by their hematite gangue, are most in demand. Prices, 25c. to \$2.50 for cabinet sizes; \$3.00 to \$10.00 for museum specimens.

Bigrigg Mine Calcites, new, clear, brilliant, and very highly modified crystals in groups, at same prices as those from the Stank mine, which they somewhat resemble.

Iridescent Pyrite on Calcite.—Two large importations were entirely sold out almost immediately. We hope to secure another lot, and, as the prices average only 25 cents to \$2.50, our customers will be able to secure some of the most beautiful specimens ever seen.

Fluorite, from England, is one of the first minerals which a beginner wants, and, after his collection has grown until he numbers them by the thousand, he wants English fluorites, because of their beauty and great variety. Our stock is very complete, so that whether you want a green or a purple, a white or a black, a blue or a yellow, you will find us able to supply you. Prices, 10 cents to \$2.50 for cabinet sizes; \$2.50 to \$25.00 for museum specimens.

Aragonite in radiated tufts of terminated crystals, two to four inches long, 25 cents to \$2.50.

Hematite, or Specular Iron, in very brilliant, tabular crystals with quartz, exceedingly beautiful, 25 cents to \$2.50. *Kidney Ore*, very good, 25 cents to \$1.50.

Cassiterite, small crystal groups, as low as ten cents. A lot of very choice prismatic crystals on the gangue, \$1.00 to \$3.00.

Dolomite, iridescent, pretty, 25 cents to \$1.00.

Barite, from the Bigrigg mine, of an exquisite, delicate blue and green, the crystals highly polished and perfect, 20 cents to \$1.25. These are very attractive. Also a very full stock of all the many other varieties of barite.

Celestite from Yate, in groups of large, tabular crystals, 50 cents to \$2.50.

Bourmonite, choice, 25 cents to \$2.00.

Chalcocite, well crystallized, 25 cents to \$2.00.

Mimetite, var. *Kampylite*, 50 cents to \$2.50.

Torbernite, small specimens, well crystallized, 25 cents to 75 cents; larger, \$1.00 to \$2.00.

Göthite, in slender crystals, 25 cents to \$1.50.

Chalcosiderite, a fine stock, 25 cents to \$2.00.

Chalcotrichite, choice, 25 cents to \$2.00.

Cuprite, fine crystal groups, 10 cents to \$2.00.

Olivenite, *Pharmacosiderite*, *Scorodite*, *Liroconite*, *Chalcophyllite*, *Libethenite*, *Ludlamite*, *Cronstedtite*, *Tetrahedrite*, *Tennantite*, *Childrenite*, *Bismuthinite*, *Stannite*, *Autunite*, *Witherite*, *Barytocalcite*, *Dufrenite*, *Marcasite*, *Apatite*, *Gilbertite*, &c., in good specimens, at prices recorded in this catalogue.

Spangolite.

This mineral is the latest addition to the long list of new species, it having been described in the May number of the *Amer. Jour. Science*, by Prof. S. L. Penfield. Only a single specimen is, as yet, known, but it is one of exceeding beauty and perfection. The mineral occurs in rich, dark green hexagonal crystals with the basal plane very prominent. Its hardness is about 2 to nearly 3; specific gravity, 3.141. The analyses of Prof. Penfield prove that Spangolite is a hydrous chloro-sulphate of copper and alumina, corresponding with the formula, $\text{Cu}_6\text{AlClSO}_{10} \cdot 9\text{H}_2\text{O}$. "There is at present no known mineral similar to Spangolite in composition; the very rare Connellite from Cornwall . . . is the nearest approach to it." The mineral is certainly one of unusual interest and it is a cause for congratulation that it has been named after the well-known, generous and enthusiastic collector, Mr. Norman Spang.

Classified List of Mineral Species.

THE following list includes all mineral species described in Dana's *System of Mineralogy*, also all species described in the Appendices, whose exact position in the System is given. The list of New Species, which is added, includes all authenticated species described in the three Appendices to Dana's System, as well as in the *American Journal of Science* from January, 1882, to May, 1890, whose place in the System is not given. We believe this includes practically all species described up to date. Bad or doubtful species which have not a recognized place in the science, are omitted entirely, or are merely mentioned in the Index. The important varieties are enumerated under the proper species, or, if omitted, their position in the classification may be ascertained by reference to the Index. The number preceding the name is the species number in Dana's *System of Mineralogy*. In the preparation of this list, we have spared no effort to make it correct. Where authorities differ, we have invariably followed Dana, though queries placed by him have been omitted, in some instances, when we found them removed in the more recent works of other eminent authors. Abbreviations have been avoided throughout in designating the crystallographic form and chemical composition; A. J. S.=*American Journal of Science*; Ap.=Appendix to Dana's *System of Mineralogy*; Sm. Rept.=Annual Report of Smithsonian Institution; Var.=Variety. The word "Massive" is used in all cases where the crystallographic form of a mineral is not known. It is not, therefore, to be understood *technically*, as a mineral so described may really be crystallized, as, for example, Lettsomite; or crystalline, Erinite; or fibrous, Crocidolite; or stalactitic, Limonite; or concretionary, Beauxite; or micaceous, Phyllite.

The prices given in the accompanying list are *average* and not necessarily (as in all previous editions of our Catalogue), those of actual specimens in stock. They are, however, based on specimens which we have ourselves handled, so that while in some cases we quote prices on species which are not in stock at the present time, it is reasonable to assume that we can supply at any time at least seventy-five per cent. of all the species quoted, and that all others which have prices attached, and indeed many others not priced at all, are *likely* to be in stock from time to time. We shall be pleased to file orders for all species not in stock, which a customer desires, and such filing of orders will give him an option on the first specimens we receive thereafter. Owing to our extensive facilities for securing minerals, our stock of even the rarest species is constantly being replenished. *Only characteristic specimens are quoted*, so that the lowest priced are by no means unworthy of the attention of the student. In many cases we have extra fine specimens in stock at higher prices than those mentioned; but as such specimens are quickly sold, we have thought it best to adopt *average* prices throughout. We have not endeavored to state the lowest figure at which we can supply specimens, for our material is in general of a superior quality; but though our specialty is *good* specimens, we can generally supply a cheaper grade to those desiring them. Perfection of crystallization, disposition of crystals on the matrix, individual modifications or peculiarities in crystals, brilliancy, shapeliness, etc., all influence a mineralogist's estimate of value. Our customers are therefore especially urged in ordering of us to state the approximate *prices* which they are willing to pay, and to leave the *size* of the specimens to be sent them at least in part to our discretion.

Each specimen sent out by us has the price plainly marked, and is accompanied by a label giving the species number, name and locality. Appreciating that accuracy of labeling is of first importance, we make it our rule to refer all doubtful material to an eminent mineralogist for determination. We, therefore, guarantee the correctness of the labeling of every specimen.

Postage or Express Charges must in all cases be borne by Purchasers.

SYNOPSIS OF THE CLASSIFICATION OF MINERALS.

- I. Native Elements.
- II. Sulphides, Tellurides, Selenides, Arsenides, Antimonides, Bismuthides.
- III. Compounds of Chlorine, Bromine, Iodine.
- IV. Fluorine Compounds.
- V. Oxygen Compounds.
 - I. Oxides, or Binary Oxygen Compounds.
 - I. Oxides of Elements of Gold, Iron, and Tin Groups.
 - II. Oxides of Elements of Arsenic and Sulphur Groups.
 - III. Oxides of Elements of Carbon-Silicon Group.
 - II. Ternary Oxygen Compounds.
 - 1. Silicates.
 - A. Anhydrous Silicates.
 - I. Bisilicates.
 - II. Unisilicates.
 - III. Subsilicates.
 - B. Hydrus Silicates.
 - I. General Section of Hydrus Silicates.
 - II. Zeolite Section.
 - III. Margarophyllite Section.
 - Appendix to Hydrus Silicates.
 - 2. Tantalates, Columbates.
 - 3. Phosphates, Arsenates, Antimonates, Nitrates.
 - A. Phosphates, Arsenates, Antimonates.
 - I. Anhydrous.
 - II. Hydrus.
 - B. Nitrates.
 - 4. Borates.
 - 5. Tungstates, Molybdates, Vanadates.
 - 6. Sulphates, Chromates, Tellurates.
 - I. Anhydrous.
 - II. Hydrus.
 - 7. Carbonates.
 - I. Anhydrous.
 - II. Hydrus.
 - 8. Oxalates.
- VI. Hydrocarbon Compounds.

I. NATIVE ELEMENTS.

- 1. **Gold**, 25c. to \$50.00; isometric; comp. gold.
 - Var. 1. Ordinary, containing 0.16 to 16 p. c. of silver.
 - 2. Electrum, containing over 16 p. c. of silver.
 - 3. Porpezite, contains palladium.
 - 4. Rhodium-gold, contains rhodium.
- 1A. **Maldonite** (Ap. I., p. 10), comp. gold, 64.5, bismuth 35.5, or Au₂Bi.
- 2. **Silver**, 5c. to \$10.00; isometric; comp. silver.
- 3. **Platinum**, 25c. to \$5.00; isometric; comp. platinum, etc.
- 4. **Platiniridium**, isometric; comp. platinum and iridium.
- 5. **Palladium**, isometric; comp. palladium, etc.
- 6. **Allopalladium**, hexagonal; comp. palladium.
- 7. **Iridosmine**, hexagonal, 25c. to \$2.00; comp. iridium and osmium.
- 8. **Mercury**, 10c. to \$1.00; isometric; comp. mercury.
- 9. **Amalgam**, \$1.00 to \$10.00; isometric; comp. silver and mercury.
- 10. **Arquerite**, 25c. to \$2.00; isometric; comp. silver and mercury.
- 10A. **Kongsbergite** (Ap. II., p. 32), comp. silver and mercury.
- 11. **Gold Amalgam**, in grains and square prisms; comp. gold and mercury.

12. **Copper**, 5c. to \$2.50; isometric; comp. copper.
13. **Iron**, 25c. to \$10.00; isometric; comp. iron and nickel, etc.
 Var. 1. Native, Greenland, 25c. to \$1.00.
 2. Meteoric, 25c. to \$10.00. We make no specialty of Meteorites, but two or three of the best known falls are always in stock, among them Toluca, Estherville, Glorietta, Knyahinya, etc.
14. **Zinc**, hexagonal; comp. zinc, etc.
15. **Lead**, \$2.50 to \$10.00; isometric; comp. lead.
16. **Tin**, tetragonal; comp. tin.
17. **Arsenic**, 10c. to \$2.00; rhombohedral; comp. arsenic.
18. **Antimony**, 10c. to \$2.50; rhombohedral; comp. antimony.
19. **Allemontite**, 25c. to \$2.50; rhombohedral; comp. arsenic and antimony.
20. **Bismuth**, 25c. to \$2.50; hexagonal; comp. bismuth.
21. **Tellurium**, 25c. to \$2.50; hexagonal; comp. tellurium.
22. **Native Sulphur**, 5c. to \$10.00; orthorhombic; comp. sulphur.
23. **Selensulphur**, 50c. to \$2.50; resembles sulphur, but of an orange or brown color, and contains selenium.
24. **Diamond**, \$1.00 to \$10.00; isometric; comp. carbon.
25. **Graphite**, 5c. to 50c.; hexagonal; comp. carbon.

II. SULPHIDES, TELLURIDES, SELENIDES, ARSENIDES ANTIMONIDES, BISMUTHIDES.

26. **Realgar**, 10c. to \$3.50; monoclinic; red sulphide of arsenic.
27. **Orpiment**, 10c. to \$2.00; orthorhombic; yellow sulphide of arsenic.
28. **Dimorphite**, orthorhombic; a sulphide of arsenic, now regarded as identical
29. **Stibnite**, 5c. to \$5.00; orthorhombic; sulphide of antimony. [with orpiment.
- 29A. **Livingstonite** (Ap. II., p. 35), orthorhombic (?); sulph-antimonide of mer-
30. **Bismuthinite**, 25c. to \$2.50; orthorhombic; sulphide of bismuth. [cury.
31. **Tetradymite**, 25c. to \$5.00; hexagonal; telluride of bismuth.
32. **Joséite**, hexagonal; seleno-telluride of bismuth.
33. **Wehrlite**, hexagonal; probably a sulph-telluride of bismuth.
- 33A. **Arsenotellurite**, (Ap. II., p. 5.); massive; sulph-arsenide of tellurium.
34. **Molybdenite**, 5c. to \$2.00; orthorhombic (?); sulphide of molybdenum.
35. **Dyscrasite**, \$2.00 to \$5.00; orthorhombic; antimonide of silver.
 Var. Chanarcillite; arsenio-antimonide of silver.
36. **Chilenite**, amorphous; bismuthide of silver.
37. **Domeykite**, \$2.50 to \$5.00; massive; arsenide of copper, Cu_3As .
 Var. Condurrite, softer, and possibly containing also arsenide of copper.
38. **Algodonite**, massive; arsenide of copper, Cu_3As .
39. **Whitneyite**, massive; arsenide of copper, Cu_3As .
40. **Argentite**, 50c. to \$5.00; isometric; sulphide of silver.
- 40A. **Argentopyrite**, sulphide of silver and iron. (See Ap. III., p. 115).
- 40B. **Jalpaite**, isometric; cupriferous sulphide of silver.
- 40C. **Polyargyrite**, (Ap. I., p. 12); isometric; sulph-antimonide of silver.
41. **Naumannite**, isometric; selenide of silver.
42. **Eucairite**, massive; selenide of copper and silver.
43. **Crookesite**, massive; selenide of copper, thallium and silver.
44. **Galenite**, 5c. to \$5.00; isometric; sulphide of lead.
- 44A. **Huascalite**, sulphide of lead and zinc.
- 44B. **Cuproplumbite**, mixture of galenite and chalcocite.
45. **Clausthalite**, isometric; selenide of lead.
 Var. Tilkerodite, contains cobalt.
46. **Zorgite**, \$1.00 to \$2.50; massive; selenide of lead and copper.
47. **Lehrbachite**, massive; selenide of lead and mercury.
48. **Altaite**, 50c. to \$2.50; isometric; telluride of lead.
49. **Bornite**, 5c. to \$1.00; isometric; sulphide of copper and iron.
50. **Berzelianite**, massive; selenide of copper.
51. **Castillite**, massive; sulphide of silver, copper, lead, iron and zinc

52. **Alabandite**, 10c. to \$2.00; isometric; sulphide of manganese.
 53. **Syepoorite**, massive; sulphide of cobalt.
 54. **Pentlandite**, isometric; sulphide of nickel and iron,
 55. **Grünauite**, isometric; sulphide of nickel, bismuth, iron, cobalt and copper.
 56. **Sphalerite**, 5c. to \$7.50; isometric; sulphide of zinc.
 56A. **Oldhamite**, (Ap. II., p. 42); isometric; meteoric sulphide of calcium.
 57. **Voltzite**, massive; oxy-sulphide of zinc.
 58. **Hessite**, \$1.00 to \$5.00; orthorhombic; telluride of silver.
 58A. **Petzite**, 50c. to \$5.00; telluride of silver and gold.
 59. **Daleminzite**, orthorhombic; sulphide of silver.
 60. **Acanthite**, \$1.00 to \$5.00; orthorhombic; sulphide of silver.
 61. **Chalcocite**, 10c. to \$2.50; orthorhombic; sulphide of copper.
 62. **Stromeyerite**, \$1.00 to \$2.50; orthorhombic; sulphide of silver and copper.
 63. **Sternbergite**, orthorhombic; sulphide of silver and iron.
 64. **Cinnabar**, 5c. to \$2.50; rhombohedral; sulphide of mercury. [cury.
 64A. **Metacinnabarite** (Ap. I., p. 10), 25c. to \$3.50; isometric; sulphide of mer-
 65. **Tiemannite**, 50c. to \$5.00; isometric; selenide of mercury.
 65A. **Onofrite**, 50c. to \$2.50; massive; sulpho-selenide of mercury.
 66. **Millerite**, 5c. to \$2.00; rhombohedral; sulphide of nickel.
 66A. **Beyrichite**, (Ap. I., p. 3) hexagonal (?); sulphide of nickel.
 67. **Troilite**, massive; meteoric sulphide of iron and nickel. (?)
 68. **Pyrrhotite**, 5c. to \$2.50; hexagonal; sulphide of iron.
 68A. **Chalcopyrrhotite** (Ap. II., p. 11), massive; sulphide of iron and copper.
 69. **Greenockite**, 10c. to \$1.00; hexagonal; sulphide of cadmium.
 70. **Wurtzite**, hexagonal; sulphide of zinc.
 71. **Niccolite**, 10c. to \$2.00; hexagonal; arsenide of nickel.
 71A. **Arsenical Cobalt**, (Ap. I., p. 1); hexagonal; arsenide of cobalt.
 72. **Breithauptite**, 25c. to \$2.50; hexagonal; antimonide of nickel.
 72A. **Arite**, (Ap. II., p. 4); massive; antimonide and arsenide of nickel.
 73. **Kaneite**, massive; arsenide of manganese.
 74. **Schreibersite**, massive; phosphide of iron and nickel.
 75. **Pyrite**, 5c. to \$5.00; isometric; sulphide of iron.
 76. **Hauerite**, isometric; sulphide of manganese.
 77. **Cubanite**, isometric; sulphide of copper and iron.
 78. **Chalcopyrite**, 5c. to \$5.00; tetragonal; sulphide of copper and iron.
 79. **Barnhardtite**, massive; sulphide of copper and iron.
 80. **Stannite**, 10c. to \$1.50; tetragonal (?); sulphide of tin, copper, iron and zinc.
 81. **Linnæite**, 50c. to \$2.50; isometric; sulphide of cobalt.
 Var. **Siegenite**; 50c. to \$2.50.
 81A. **Horbachite** (Ap. II., p. 28), massive; sulphide of iron and nickel.
 82. **Carrollite**, isometric; sulphide of copper and cobalt.
 83. **Smaltite**, 10c. to \$7.50; isometric; arsenide of cobalt, nickel and iron.
 Var. 1. Cobaltic Smaltine.
 2. Niccoliferous, Chloanthite.
 3. Ferrikerous, Safflorite. [and copper.
 83A. **Spathiopyrite** (Ap. II., p. 52), orthorhombic; sulph-arsenide of cobalt, iron
 84. **Skutterudite**, \$1.50; isometric; arsenide of cobalt.
 85. **Cobaltite**, 5c. to \$2.00; isometric; sulph-arsenide of cobalt.
 86. **Gersdorffite**, 10c. to \$1.50; isometric; sulph-arsenide of nickel.
 87. **Ullmannite**, 25c. to \$2.00; isometric; sulph-antimonide of nickel.
 88. **Corynite**, isometric; sulph-arsen-antimonide of nickel.
 89. **Laurite**, isometric; sulphide of osmium and ruthenium.
 90. **Marcasite**, 5c. to \$1.50; orthorhombic; sulphide of iron.
 91. **Löllingite**, orthorhombic; arsenide of iron.
 92. **Rammelsbergite**, orthorhombic; arsenide of nickel.
 92A. **Wolfachite**, (Ap. I., p. 17); orthorhombic; sulph-arsen-antimonide of nickel.
 93. **Leucopyrite**, 5c. to 50c.; orthorhombic; sesquiarsenide of iron.
 Var. **Geyerite**, between Löllingite and Leucopyrite.
 93A. **Glaucopyrite**, (Ap. I., p. 6); orthorhombic; sulph-antimon-arsenide of iron
 and cobalt.
 94. **Arsenopyrite**, 5c. to \$1.50; orthorhombic; sulph-arsenide of iron.
 Var. **Danaite** (also **Vermontite** and **Akontite**), 4-10 p. c. cobalt.

- 94A. **Plinian**, monoclinic; comp. like arsenopyrite.
 95. **Glauco-dot**, 50c. to \$2.50; orthorhombic; sulph-arsenide of cobalt and iron.
 96. **Pacite**, orthorhombic; sulph-arsenide of iron.
 97. **Alloclasite**, orthorhombic; sulph-arsenide of bismuth and cobalt.
 98. **Sylvanite**, 50c. to \$7.50; monoclinic; telluride of gold and silver.
 98A. **Calaverite**, \$2.50 to \$10.00; massive; telluride of gold and silver.
 99. **Nagyagite**, 50c. to \$5.00; orthorhombic; sulpho-telluride of lead and gold.
 100. **Covellite**, 10c. to \$1.00; hexagonal; protosulphide of copper.
 100A. **Melonite**, hexagonal; telluride of nickel.
 101. **Chalcostibite**, orthorhombic; sulph-antimonide of copper.
 102. **Emplectite**, 25c. to \$2.50; orthorhombic; sulphide of bismuth and copper.
 103. **Chiviatite**, massive; sulphide of bismuth, copper and lead.
 104. **Berthierite**, 25c. to \$2.00; massive; sulph-antimonide of iron.
 105. **Sartorite**, orthorhombic; sulph-arsenide of lead.
 106. **Zinkenite**, 25c. to \$2.50; orthorhombic; sulph-antimonide of lead.
 107. **Jordanite**, \$1.00 to \$10.00; orthorhombic; sulph-arsenide of lead.
 108. **Miargyrite**, 50c. to \$5.00; monoclinic; sulph-antimonide of silver.
 109. **Plagionite**, 25c. to \$2.50; monoclinic; sulph-antimonide of lead.
 110. **Binnite**, 50c. to \$5.00; isometric; sulph-arsenide of copper.
 111. **Brongniardite**, isometric; sulph-antimonide of silver and lead.
 112. **Jamesonite**, 10c. to \$2.50; orthorhombic; sulph-antimonide of lead.
 112A. **Cosalite**, 50c. to \$2.50; massive; sulphide of bismuth and lead.
 112B. **Schirmerite**, (Ap. II., p. 50); massive; sulphide of lead, bismuth and silver.
 113. **Dufrenoy'site**, 50c. to \$5.00; orthorhombic; sulph-arsenide of lead.
 113A. **Diaphorite** (Ap. I., p. 4), \$1.00 to \$3.50; orthorhombic; sulph-antimonide of lead and silver.
 114. **Freieslebenite**, 50c. to \$7.50; monoclinic; sulph-antimonide of lead and silver.
 115. **Pyrostilpnite**, \$1.00 to \$5.00; monoclinic; sulph-antimonide of silver.
 116. **Rittingerite**, \$5.00 to \$10.00; monoclinic; selenide of silver. (?)
 117. **Pyrargyrite**, 25c. to \$5.00; rhombohedral; sulph-antimonide of silver.
 118. **Proustite**, 25c. to \$10.00; rhombohedral; sulph-arsenide of silver. [copper.
 119. **Bournonite**, 10c. to \$2.50; orthorhombic; sulph-antimonide of lead and
 120. **Stylosite**, orthorhombic; sulph-antimonide of silver, copper and iron.
 121. **Wittichenite**, orthorhombic; sulphide of bismuth and copper.
 121A. **Klaprotholite**, (Ap. I., p. 8); orthorhombic; sulphide of bismuth and copper.
 122. **Boulangerite**, 25c. to \$2.00; massive; sulph-antimonide of lead.
 122A. **Epiboulangerite**, (Ap. I., p. 5); orthorhombic; sulph-antimonide of lead.
 123. **Kobellite**, 25c. to \$1.50; massive; sulph-antimonide of lead and bismuth.
 124. **Aikinite**, orthorhombic; sulphide of lead, bismuth and copper.
 125. **Tetrahedrite**, 10c. to \$5.00; isometric; sulph-antimonide of copper.
 Var. 1. **Freibergite**; 10c. to \$1.50; contains silver.
 2. **Schwatzeite**, **Spaniolite** and **Hermesite** contain mercury.
 3. **Platiniferous**; contains platinum.
 126. **Polytelite**, massive; sulph-antimonide of silver and lead.
 127. **Tennantite**, 10c. to \$2.50; isometric; sulph-arsenide of copper and iron.
 127A. **Julianite**, (Ap. I., p. 8); isometric; sulph-arsenide of copper.
 128. **Meneghinite**, monoclinic; sulph-antimonide of lead.
 129. **Geocronite**, orthorhombic; sulph-antimonide of lead.
 130. **Stephanite**, 25c. to \$5.00; orthorhombic; sulph-antimonide of silver.
 131. **Polybasite**, 10c. to \$5.00; orthorhombic; sulph-antimonide of silver.
 132. **Enargite**, 10c. to \$2.00; orthorhombic; sulph-arsenide of copper.
 132A. **Epigenite**, (Ap. I., p. 5); orthorhombic; sulph-arsenide of copper and iron.
 132B. **Famatinite**, (Ap. II., p. 20); orthorhombic; sulph-antimon-arsenide of copper.
 133. **Xanthoconite**, rhombohedral; sulph-arsenide of silver.
 134. **Clayite**, isometric; sulph-arsen-antimonide of lead and copper. (?)
 135. **Bolivianite**, orthorhombic; sulph-antimonide of silver.

III. COMPOUNDS OF CHLORINE, BROMINE, IODINE.

136. **Calomel**, 25c. to \$2.00; tetragonal; chloride of mercury.
 137. **Sylvite**, 25c. to \$2.00; isometric; chloride of potassium.
 138. **Halite**, 5c. to \$1.00; isometric; chloride of sodium.
 139. **Sal Ammoniac**, 10c. to \$2.00; isometric; chloride of ammonium.
 140. **Cerargyrite**, 10c. to \$2.50; isometric; chloride of silver.
 141. **Embolite**, 10c. to \$2.50; isometric; chloro-bromide of silver.
 142. **Bromyrite**, isometric; bromide of silver.
 143. **Iodyrite**, hexagonal; iodide of silver.
 144. **Coccinite**, in rhombic pyramids; iodide of mercury. (?)
 144A. **Bordosite**, (Ap. II., p. 8); chloride of silver and mercury.
 145. **Cotunnite**, orthorhombic; chloride of lead.
 146. **Molysite**, massive; chloride of iron.
 146A. **Nantokite**, (Ap. I., p. 11., and II., p. 40); isometric; chloride of copper.
 147. **Carnallite**, 10c. to \$1.00; massive; hydrous chloride of magnesium and potassium.
 148. **Tachhydrite**, 10c. to \$1.00; massive; hydrous chloride of calcium and magnesium. [sium and iron.
 148A. **Erythrosiderite**, (Ap. II., p. 19); orthorhombic; hydrous chloride of potassium and iron.
 149. **Kremersite**, isometric; hydrous chloride of potassium, ammonium and iron.
 150. **Matlockite**, \$1.00 to \$10.00; tetragonal; oxy-chloride of lead.
 151. **Mendipite**, 10c. to \$2.00; orthorhombic; oxy-chloride of lead. [lead.
 152. **Schwarzembergite**, \$1.00 to \$5.00; isometric; oxy-chloride and iodide of lead.
 153. **Atacamite**, 10c. to \$2.50; orthorhombic; hydrous oxy-chloride of copper.
 153A. **Tallingite**, \$1.00; massive; hydrous oxy-chloride of copper.
 154. **Percylite**, \$1.00 to \$5.00; isometric; hydrous oxy-chloride of copper and lead.
 155. Chloride of Magnesium.
 156. **Scacchite**, (Ap. II., p. 50); chloride of manganese.
 157. Iodide of zinc.
 158. Bromide of zinc.

IV. FLUORINE COMPOUNDS.

159. **Fluorite**, 5c. to \$25.00; isometric; fluoride of calcium.
 Var. 1. **Ratofkite**, earthy, lavender blue, from Russia.
 2. **Chlorophane**; 10c. to \$1.00; shows a green phosphorescence.
 160. **Yttrocerite**, 10c. to \$1.00; massive; hydrous fluoride of calcium, yttrium and cerium.
 161. **Fluocerite**, hexagonal; fluoride of cerium.
 162. **Fluocerine**, isometric (?); hydrous oxy-fluoride of cerium.
 163. **Fluellite**, orthorhombic; fluoride of aluminum.
 163A. **Ralstonite**, (Ap. I., p. 18); isometric; hydrous fluoride of aluminum, magnesium, sodium and calcium.
 163B. **Sellaite**, (Ap. I., p. 14); tetragonal; fluoride of magnesium.
 164. **Cryolite**, 5c. to \$2.50; triclinic; fluoride of aluminum and sodium.
 165. **Arksutite**, massive; fluoride of aluminum, sodium and calcium.
 166. **Chiolite**, tetragonal; fluoride of aluminum and sodium.
 167. **Chodneffite**, tetragonal; fluoride of aluminum and sodium.
 168. **Pachnolite**, 10c. to \$1.00; monoclinic; hydrous fluoride of aluminum, calcium and sodium.
 169. **Thomsenolite**, 25c. to \$1.00; monoclinic; hydrous fluoride of aluminum, calcium and sodium.
 169A. **Hagemannite**, 25c. to \$1.00; near Thomsenolite.
 170. **Gearsutite**, 10c. to \$1.00; massive; hydrous fluoride of aluminum and calcium.
 171. **Prosopite**, monoclinic; hydrous fluoride of aluminum, calcium and silicon.

V. OXYGEN COMPOUNDS.

I. Oxides, or Binary Oxygen Compounds.

I. Oxides of Elements of Gold, Iron and Tin Groups.

172. **Cuprite**, 5c. to \$5.00; isometric; protoxide of copper.
Var. Chalcotrichite; 25c. to \$2.50.
173. **Periclase**, isometric; protoxide of magnesium and iron.
174. **Bunsenite**, isometric; protoxide of nickel.
175. **Water**, hexagonal; protoxide of hydrogen.
176. **Zincite**, 5c. to \$2.50; hexagonal; protoxide of zinc.
177. **Massicot**, orthorhombic; protoxide of lead.
178. **Melaconite**, 10c. to \$1.00; isometric; protoxide of copper.
- 178A. **Delafossite**, (Ap. II., p. 16); massive; oxide of copper and iron. (?)
179. **Corundum**, 5c. to \$5.00; rhombohedral; sesquioxide of aluminum.
Var. 1. Sapphire; 10c. to \$5.00; the finely colored, transparent to translucent, useful as gems. Ruby is the red sub-variety, 10c. to \$2.50.
2. Emery; 5c. to 50c.; granular, contains magnetite or hematite.
180. **Hematite**, 5c. to \$2.50; rhombohedral; sesquioxide of iron.
Superb Elba and Swiss specimens always in stock. (See also page 58)
- 180A. **Martite**, 5c. to 50c.; isometric; sesquioxide of iron.
181. **Menaccanite**, 5c. to \$1.00; rhombohedral; sesquioxide of iron and titanium.
- 181A. **Iserite**, 10c. to 50c.; isometric menaccanite.
182. **Perovskite**, 5c. to \$2.00; isometric; sesquioxide of titanium and calcium.
(See page 29.)
188. **Spinel**, 5c. to \$2.50; isometric; oxide of magnesium and aluminum.
184. **Hercynite**, isometric; oxide of aluminum and iron.
185. **Gahnite**, 10c. to \$2.50; isometric; oxide of zinc and aluminum.
Var. 1. Automolite, 25c. to \$2.50; zinc Gahnite.
2. Dysluite, 10c. to \$2.50; zinc-manganese-iron Gahnite.
3. Kreittonnite; zinc-iron Gahnite.
- 185A. **Dimagnetite**, orthorhombic; a magnetite pseudomorph. (?)
186. **Magnetite**, 5c. to \$2.00; isometric; sesquioxide and protoxide of iron.
Lodestone, 10c. to \$1.00, is the strongly magnetic variety.
187. **Magnesioferrite**, isometric; oxide of iron and magnesium.
188. **Franklinite**, 5c. to \$5.00; isometric; oxide of iron, manganese and zinc.
- 188A. **Jacobsite**, (Ap. I., p. 8); 25c. to \$1.00; isometric; oxide of iron, manganese and magnesium.
189. **Chromite**, 5c. to 50c.; isometric; oxide of chromium and iron.
190. **Uraninite**, 25c. to \$2.50; isometric; oxide of uranium. [num]
191. **Chrysoberyl**, 25c. to \$25.00; orthorhombic; oxide of beryllium and aluminum.
Var. Alexandrite, 50c. to \$25.00; colored green by chrome.
192. **Cassiterite**, 5c. to \$2.50; tetragonal; oxide of tin.
Var. Stream tin and wood tin, botryoidal or reniform; 5c. to \$1.00.
- 192A. **Ainalite**, a cassiterite containing nearly 9 p. c. tantalum oxide.
193. **Rutile**, 5c. to \$10.00; tetragonal; oxide of titanium.
We have a fine stock of highly modified N. C. crystals at 10c. to 50c.; also some large crystals from Graves Mt., Ga., at \$1.50 to \$20.00. See also Ark.
194. **Octahedrite**, 25c. to \$5.00; tetragonal; oxide of titanium. [Rutiles, p. 29.]
195. **Hausmannite**, 10c. to \$1.00; tetragonal; protoxide and sesquioxide of manganese.
196. **Braunite**, 25c. to \$1.50; tetragonal; sesquioxide of manganese. [ganese.]
197. **Minium**, 25c. to \$5.00; massive; oxide of lead.
198. **Brookite**, 5c. to \$5.00; orthorhombic; oxide of titanium. [See page 29.]
- 198A. **Eumanite**, near Brookite.
199. **Pyrolusite**, 5c. to \$2.00; orthorhombic; binoxide of manganese.
Var. Polianite, now regarded as a distinct tetragonal species (A. J. S.,
200. **Crednerite**, monoclinic; oxide of copper and manganese. [March, 1888.]
201. **Plattnerite**, hexagonal; binoxide of lead.
- 201A. **Vanadic Ochre**, massive; sesquioxide of vanadium.
202. **Turgite**, 10c. to \$1.00; massive; hydrated sesquioxide of iron.
203. **Diaspore**, 25c. to \$2.50; orthorhombic; hydrated sesquioxide of aluminum.

204. **Göthite**, 5c. to \$2.00; orthorhombic; hydrated sesquioxide of iron.
 Var. 1. Sammetblende, Przibramite, Needle-Ironstone, acicular crystals, often radiately grouped; 25c. to \$1.00.
 2. Onegite, or Fullonite, acicular Göthite penetrating quartz.
 3. Lepidocrocite; 10c. to \$1.00; scaly-fibrous or feathery-columnar.
205. **Manganite**, 10c. to \$2.50; orthorhombic; hydrated sesquioxide of manga-
 206. **Limonite**, 5c. to 50c.; massive; hydrated sesquioxide of iron. [nese.
 207. **Xanthosiderite**, 10c. to 50c.; massive; hydrated sesquioxide of iron.
 208. **Beauxite**, 5c. to 50c.; massive; hydrated sesquioxide of aluminum and iron.
 209. **Eliasite**, massive; hydrous oxide of uranium, iron and lead.
 210. **Brucite**, 10c. to \$5.00; rhombohedral; hydrous oxide of magnesium.
 Var. Nematite; fibrous; 10c. to \$1.00.
211. **Pyrochroite**, massive; hydrous oxide of magnesium.
 212. **Gibbsite**, 5c. to 50c.; hexagonal; hydrous oxide of aluminum.
 213. **Limnate**, massive; hydrous oxide of iron.
 214. **Hydrotalcite**, hexagonal; hydrous oxide of aluminum and magnesium.
 Var. Houghite; 10c. to 50c. [magnesium, etc.
- 214A. **Namaqualite**, (Ap. I., p. 11); massive; hydrous oxide of copper, aluminum,
 215. **Pyroaurite**, hexagonal; hydrous oxide of iron and magnesium.
 216. **Gummite**, 25c. to \$5.00; amorphous; hydrous oxide of uranium.
 217. **Psilomelane**, 5c. to 50c.; massive; hydrous oxide of manganese and barium.
 218. **Wad**, 5c. to \$1.00; massive; hydrous oxide of manganese.
 Var. 1. Manganesian, Bog Manganese; 5c. to 50c.
 2. Cobaltiferous, Asbolite, 10c. to 50c.
 3. Cupriferous, Lampadite; 10c. to 50c.
 4. Containing Lithium, Lithiophorite; 25c. to \$1.00.
- 218E. **Rabdionite**, (Ap. I., p. 13); massive; hydrous oxide of iron, manganese, copper and cobalt.

II. OXIDES OF ELEMENTS OF ARSENIC AND SULPHUR GROUP.

219. **Arsenolite**, isometric; sesquioxide of arsenic.
 220. **Senarmontite**, 25c. to \$2.00; isometric; sesquioxide of antimony.
 221. **Valentinite**, 25c. to \$2.00; orthorhombic; sesquioxide of antimony.
 221A. **Claudetite**, orthorhombic; sesquioxide of arsenic.
 222. **Bismite**, massive; sesquioxide of bismuth.
 223. **Karelinite**, massive; protoxide and sulphide of bismuth.
 224. **Molybdate**, 10c. to 50c.; orthorhombic; sesquioxide of molybdenum.
 224A. **Ilsemannite**, (Ap. I., p. 7); massive; molybdate of molybdenum.
 225. **Tungstite**, massive; oxide of tungsten.
 225A. **Meymacite**, (Ap. II., p. 38); hydrous oxide of tungsten.
 226. **Kermesite**, 25c. to \$3.50; monoclinic; oxide and sulphide of antimony.
 227. **Cervantite**, 10c. to \$1.00; orthorhombic; bin oxide of antimony.
 228. **Stibiconite**, massive; hydrous oxide of antimony.
 Var. 1. Partzite, 10c. to \$1.00.
 2. Stetefeldtite, 10c. to \$1.00.
229. **Volgerite**, massive; hydrous oxide of antimony.
 230. **Tellurite**, 50c. to \$2.50; orthorhombic; oxide of tellurium.
 230A. **Tantalich Ochre**, massive; hydrous oxide of tantalum.

III. OXIDES OF ELEMENTS OF CARBON-SILICON GROUP.

231. **Quartz**, 5c. to \$10.00; rhombohedral; bin oxide of silicon.
 A. Vitreous Varieties: [to \$2.00.
 1. Rock Crystal; (a) Regular Crystals, 5c. to \$10.00; (b) Drusy, 5c.
 2. Asteriated. 3. Amethyst; 5c. to \$10.00. 4. Rose; 5c. to \$1.00.
 5. Yellow. 6. Smoky, Cairngorm Stone, Smoky Topaz; 5c. to \$10.00.
 7. Milky; 5c. to 25c.; Greasy; 10c. to 50c.
 8. Siderite, or Sapphire Quartz.

9. Sagenitic; (a) Rutilated, 10c. to \$5.00; (b) Enclosing black tourmaline, 25c. to \$2.50; (c) Enclosing Göthite, 25c. to \$2.50; (d) Enclosing Stibnite, 50c. to \$2.50; (e) Enclosing Asbestos, 25c. to \$2.50; (f) Enclosing Actinolite or Byssolite, 5c. to \$2.50; (g) Enclosing Hornblende, 10c. to \$2.50; (h) Enclosing Epidote, 25c. to \$2.50. Other rare enclosures are in stock.
10. Cat's Eye, 25c. to \$2.50. 11. Aventurine, 25c. to \$2.50.
12. Impure; (a) Ferruginous, 5c. to \$1.00; (b) Chloritic, 5c. to \$1.00; (c) Actinolitic; (d) Micaceous; (e) Arenaceous.
13. Containing Liquids; 50c. to \$5.00.
- B. Cryptocrystalline Varieties:**
1. Chalcedony; 5c. to \$2.50; enclosing water, Uruguay, \$2.50 to \$10.00
2. Carnelian; 10c. to \$1.00. 3. Chrysoprase; 10c. to \$2.00.
4. Prase; 10c. to \$1.00. 5. Plasma; Heliotrope or Blood Stone, 25c. to \$2.50. 6. Agate; 5c. to \$5.00. We have a very large stock of all kinds polished. (a) Banded, 5c. to \$5.00; (b) Clouded, 10c. to \$1.00; (c) Moss, 5c. to \$1.00.
7. Onyx; 10c. to \$1.00. 8. Sardonyx; 10c. to \$1.00.
9. Agate Jasper. 10. Silicious Sinter. 11. Flint; 5c. to 50c.
12. Hornstone or Chert; 5c. to 50c. 13. Basanite, Lydian Stone, or Touchstone; 10c. to 50c. 14. Jasper; 5c. to \$1.00.
- C. Other Varieties.**
1. Granular Quartz; 5c. to 25c. 2. Quartzose Sandstone.
3. Quartz-Conglomerate. 4. Itacolumite or Flexible Sandstone; 5c. to \$2.50. 5. Buhrstone. 6. Pseudomorphous Quartz; (a) Tabular; 5c. to 50c.; (b) Haytorite, pseudo. Datolite; (c) Beckite, pseudo. Coral; 25c. to \$1.00; (d) Babel Quartz; 50c. to \$1.50; (e) Silicified Shells; (f) Silicified Wood (including Jasperized Wood), 5c. to \$1.00; fine polished specimens, \$1.00 to \$35.00. Many other interesting pseudomorphs are in stock, such as after Calcite, Glauberite, Thenardite, Gypsum, Fluorite.
- 231A. **Tridymite**, 10c. to \$1.50; triclinic; binoxide of silicon.
- 231B. **Asmanite**, (Ap. II., p. 5); orthorhombic; meteoric binoxide of silicon.
232. **Opal**, 5c. to \$5.00; massive; binoxide of silicon.
- Var. 1. Precious Opal; 25c. to \$5.00. 2. Fire-Opal; 10c. to \$2.00.
3. Girasol. 4. Common Opal; 5c. to \$1.00; includes Resin Opal, Semi-Opal; 10c. to \$1.00; Hydrophane; 25c. to \$1.00; Forch-erite; 25c. to \$1.00.
5. Cacholong; 10c. to \$1.00. 6. Opal-Agate; 25c. to \$2.50.
7. Menilite; 10c. to 50c. 8. Jasp-Opal.
9. Wood-Opal; 10c. to \$2.00.
10. Hyalite, Muller's Glass; 25c. to \$5.00.
11. Fiorite or Silicious Sinter; (a) Pearl Sinter; (b) Michaelite; (c) Geyserite; 5c. to \$1.00.
12. Float-stone. 13. Tripolite; 5c. to 50c.; (a) Infusorial Earth; (b) Randanite; (c) Tripoli Slate; (d) Alumocalcite.
233. **Jenzschite**, massive; binoxide of silicon.

II. TERNARY OXYGEN COMPOUNDS.

1. SILICATES.

A. ANHYDROUS SILICATES.

I. BISILICATES.

234. **Enstatite**, 10c. to \$2.50; orthorhombic; silicate of iron and magnesium.
- Var. Bronzite; 10c. to \$1.00.
235. **Hypersthene**, 10c. to \$2.00; orthorhombic; silicate of iron and magnesium.
236. **Diaclasite**, orthorhombic; silicate of magnesium, iron and calcium.
237. **Wollastonite**, 5c. to \$1.00; monoclinic; silicate of calcium.
- 237A. **Edelforsite**, massive; silicate of calcium.

238. **Pyroxene**, 5c. to \$5.00; monoclinic; bisilicate of protoxide bases.
 Var. 1. Lime-magnesia Pyroxene, Malacolite or Diopside. (a) Malacolite; 5c. to 50c; (b) Alalite; (c) Traversellite; (d) Mussite; 10c. to 50c; (e) White Coccolite; 5c. to 50c.
 2. Lime-magnesia-iron Pyroxene, Sahlite. (a) Sahlite; 10c. to 50c.; (b) Baikalite; (c) Protheite; (d) Funkite; (e) Diallage.
 3. Iron-lime Pyroxene, Hedenbergite.
 4. Lime-magnesia-manganese Pyroxene, Schefferite.
 5. Lime-iron-manganese Pyroxene.
 6. Lime-iron-manganese-zinc Pyroxene; Jeffersonite; 10c. to \$2.50.
 7. Aluminous-lime-magnesia Pyroxene, Leucaugite.
 8. Aluminous-lime-magnesia-iron Pyroxene, Fassaitte, Augite. (a) Fassaitte; 25c. to \$1.00; (b) Augite; 5c. to \$2.50; (c) Alluminous Diallage.
 9. Aluminous-iron-lime Pyroxene, Hudsonite.
 10. Asbestos, (in part only). See also Amphibole.
 11. Breislakite; 10c. to \$1.00. 12. Lavroffite.
 Altered Pyroxenes: 13. Hydrous Augite. 14. Picrophyll. 15. Pyralolite. 16. Schiller Spar. 17. Traversellite. 18. Pitkarandite. 19. Strakonitzite. 20. Monrandite. 21. Hydrous Diallages. 22. Uralite.
- 238A. **Omphacite**, monoclinic; —a variety of pyroxene.
- 238B. **Violan**, 25c. to \$1.50; monoclinic; silicate of calcium, magnesium, aluminum, iron, manganese and sodium.
239. **Ægirite**, 5c. to \$5.00; monoclinic; silicate of iron, calcium and sodium.
240. **Acmite**, 50c. to \$2.50; monoclinic; silicate of iron and sodium.
241. **Rhodonite**, 5c. to \$10.00; triclinic; silicate of manganese.
 Var. 1. Bustamite, 25c. to \$2.00; contains calcium.
 2. Fowlerite, 5c. to \$10.00; contains zinc.
242. **Babingtonite**, 25c. to \$2.50; triclinic; silicate of iron, manganese and calcium.
243. **Spodumene**, 5c. to \$1.00; monoclinic; silicate of aluminum and lithium.
 Var. Hiddenite, 50c. to \$10.00; (Ap. III, p. 112).
244. **Petalite**, 10c. to \$1.50; monoclinic; silicate of aluminum, lithium and sodium.
 Var. Castorite; 50c. to \$1.50.
245. **Kupferite**, monoclinic; silicate of magnesium.
246. **Anthophyllite**, 10c. to \$1.00; orthorhombic; silicate of magnesium and iron.
- 246A. **Piddingtonite**, near Anthophyllite.
247. **Amphibole**, 5c. to \$2.50; monoclinic; bisilicate of protoxide bases.
 Var. 1. Magnesia-lime Amphibole, Tremolite, 5c. to \$1.00.
 1a. Nephrite or Jade, near Tremolite, 10c. to \$10.00.
 1b. Hexagonite, 10c. to 75c.
 2. Magnesia-lime-iron Amphibole, Actinolite, 5c. to \$1.00.
 3. Magnesia-iron Amphibole, Antholite.
 4. Magnesia-lime-manganese Amphibole, Richterite.
 5. Iron-magnesia Amphibole, Cummingtonite.
 6. Iron-manganese Amphibole, Dannemorite.
 7. Iron Amphibole, Grünerite.
 8. Asbestos, 5c. to \$1.00; includes (a) Amianthus, 10c. to \$1.00; (b) Mountain Leather, 25c. to \$1.00; (c) Mountain Cork, 25c. to \$1.00; (d) Mountain Wood, 25c. to \$1.00; (e) Byssolite, 5c. to \$1.00.
 9. Aluminous magnesia-lime Amphibole; (a) Edenite, 5c. to 50c.; (b) Smaragdite, 5c. to 50c.
 10. Aluminous magnesia-lime-iron Amphibole; (a) Pargasite, 10c. to 50c.; (b) Hornblende, 5c. to \$2.50.
 11. Aluminous iron-lime Amphibole, Noralite.
 12. Aluminous iron-manganese Amphibole, Gamsigradite.
 13. Hydrous Anthophyllite, 5c. to 50c., is an altered tremolite.
- 247A. **Waldheimite**, near amphibole, but contains much soda.
- 247B. **Kokscharoffite**, near amphibole.
- 247C. **Schefferite**, near amphibole. [and aluminum.
- 247D. **Nigrescite** (Ap. I, p. 12); massive; hydrous silicate of magnesium, iron
248. **Arrvedsonite**, 10c. to \$2.00; monoclinic (?); silicate of iron and sodium.

249. **Crocidolite**, 10c. to \$1.00; massive; silicate of iron, magnesium and sodium; commonly occurs altered to quartz and popularly known as "Tiger-Eye." Polished specimens, 10c. to \$2.00. [magnesium.]
250. **Wichtisite**; massive; silicate of aluminum, iron, calcium, sodium and
251. **Glaucophane**; monoclinic; silicate of aluminum, iron, magnesium, calcium and sodium.
252. **Sordavalite**; massive; silicate of aluminum, iron and magnesium. [sodium.]
253. **Tachylite**; massive; silicate of aluminum, iron, calcium, magnesium and
254. **Beryl**, 5c. to \$10.00; hexagonal, silicate of aluminum and beryllium.
 Var. 1. Emerald, 50c. to \$10.00.
 2. Aquamarine, 10c. to \$5.00. (See page 46.)
255. **Eudialyte**, 10c. to \$5.00; rhombohedral; silicate of sodium, calcium, iron
 Var. Eucolite, 25c. to \$1.50. (See page 29.) [and zirconium.]
256. **Pollucite**, 50c. to \$1.50; isometric; silicate of aluminum and caesium.

II.—UNISILICATES.

257. **Forsterite**; orthorhombic; silicate of magnesium.
 Var. Boltonite; 5c. to 50c.
258. **Monticellite**; orthorhombic; silicate of calcium and magnesium.
259. **Chrysolite**; 10c. to \$2.50; orthorhombic; silicate of magnesium and iron.
 Var. 1. Precious, 25c. to \$2.50. 2. Common, olivene, 10c. to \$1.00
- 259A. **Hortonolite** (Ap. I., p. 7); orthorhombic; silicate of iron, magnesium and manganese.
260. **Fayalite**; massive; silicate of iron.
261. **Iron-Manganese Chrysolite**.
- 261A. **Roeppeite** (Ap. I., p. 13), orthorhombic; silicate of iron, manganese and zinc.
262. **Tephroite**; 10c. to \$1.00; orthorhombic; silicate of manganese.
- 262A. **Hydrotephroite**; hydrous silicate of manganese and magnesium.
263. **Knebelite**; massive; silicate of manganese and iron. [and sodium.]
264. **Leucophanite**; 25c. to \$2.00; monoclinic; fluo-silicate of beryllium, calcium
265. **Wöhlerite**; 25c. to \$3.50; monoclinic; silico-columbate of zirconium,
266. **Willemite**; 5c. to \$2.50; rhombohedral; silicate of zinc. [calcium, etc.]
 Var. Troostite; 5c. to \$2.50.
267. **Phenacite**; 10c. to \$10.00; rhombohedral; silicate of beryllium
 See page 47. [calcium and sodium,]
268. **Meliphanite**; 25c. to \$2.50; tetragonal or hexagonal; fluo-silicate of beryllium.
269. **Helvite**; 50c. to \$3.00; isometric; silicate and sulphide of beryllium, manganese and iron. [and zinc.]
270. **Danalite**; isometric; silicate and sulphide of beryllium, iron, manganese
271. **Garnet**, 5c. to \$10.00; isometric; unisilicate of sesquioxide and protoxide bases.
 Var. 1. Lime-alumina garnet, Grossularite. (a) Grossularite, 10c. to \$1.50; (b) Essonite or cinnamon-stone, 10c. to \$2.50; (c) Succinite; (d) Romanzovite.
 2. Magnesia-alumina garnet, Pyrope, 5c. to 50c.
 3. Iron-alumina garnet, Almandite, 5c. to \$2.50.
 4. Manganese-alumina garnet, Spessartite, 10c. to \$3.50.
 5. Lime-iron garnet, Andradite.
 Sub-division 1—Simple lime-iron garnet. (a) Topazolite, 25c. to \$2.50. (b) Colophonite, 10c. to \$1.00. (c) Melanite, 10c. to \$2.50. (d) Jelletite, 50c. to \$5.00.
 Sub-division 2—Manganesian lime-iron garnet. (a) Rothoffite, including also Allochroite and Polyadelphite, 5c. to \$2.50.
 (b) Aplome, 50c. to \$2.50.
 Sub-division 3—Yttriferous lime-iron garnet, Yttergarnet.
 6. Lime-magnesia-iron garnet, Bredbergite, 50c. to \$2.50.
 7. Lime-chrome garnet, Ouvarovite, 25c. to \$10.00.
272. **Zircon**, 5c. to \$10.00; tetragonal; silicate of zirconium.
- 272A. **Malacon**, 5c. to \$1.00; probably an altered zircon.
- 272B. **Cyrtolite**, 25c. to \$5.00; probably an altered zircon.
- 272C. **Tachyaphaltite**; probably an altered zircon.
- 272D. **Oerstedite**, 25c. to \$1.00; probably an altered zircon.

- 272E. **Auerbachite**; probably an altered zircon.
 272F. **Bragite**; probably an altered zircon.
 273. **Vesuvianite**, 5c. to \$2.50; tetragonal; silicate of aluminum, iron, calcium
 Var. Cyprine, blue, 10c. to \$2.00. [and magnesium.
 274. **Melilite**, 25c. to \$2.00; tetragonal; silicate of aluminum, iron, calcium,
 magnesium, and sodium. [manganese.
 275. **Sphenoclase**, massive; silicate of calcium, aluminum, magnesium, iron and
 276. **Epidote**, 5c. to \$5.00; monoclinic; silicate of aluminum, iron and calcium.
 276A. **Koelbingite**; monoclinic; silicate of iron and calcium.
 277. **Piedmontite**, 10c. to \$1.00; monoclinic; silicate of aluminum, iron, man-
 ganese and calcium. [calcium.
 278. **Allanite**, 5c. to \$1.00; monoclinic; silicate of aluminum, cerium, iron and
 279. **Muromontite**; massive; silicate of yttrium, cerium, iron, &c.
 279A. **Bodenite**; silicate of aluminum, iron, cerium, yttrium, &c.
 279B. **Michaelsonite**; near Muromontite.
 280. **Zoisite**, 5c. to \$1.50; orthorhombic; silicate of aluminum, iron and calcium.
 Var. Thulite, pink, 10c. to \$1.50.
 280A. **Jadeite**, massive; silicate of aluminum, calcium and sodium.
 281. **Partschinite**, monoclinic; silicate of aluminum, iron and manganese.
 282. **Gadolinite**, 25c. to \$5.00; monoclinic; silicate of yttrium, cerium, iron,
 beryllium, &c.
 283. **Mosandrite**, 50c. to \$2.50; monoclinic; silicate of titanium, cerium,
 calcium, &c.
 284. **Ilvaite**, 25c. to \$2.50; orthorhombic; silicate of iron and calcium.
 284A. **Ardennite**, (Ap. II., p. 4) orthorhombic; silicate of aluminum and manga-
 nese, containing arsenic and vanadium.
 285. **Axinite**, 50c. to \$10.00; triclinic; boro-silicate of aluminum, calcium and iron.
 286. **Danburite**, 25c. to \$2.00; orthorhombic; boro-silicate of calcium.
 287. **Iolite**, 25c. to \$2.50; orthorhombic; silicate of aluminum, iron and magnesium.
 288. **Phlogopite**, 5c. to \$1.00; monoclinic; fluo-silicate of aluminum, potassium
 288A. **Aspidolite**, (Ap. I., p. 2) orthorhombic; a sodium phlogopite. [and magnesium.
 289. **Biotite**, 5c. to \$1.00; monoclinic; silicate of iron, aluminum, potassium and
 magnesium.
 290. **Lepidomelane**, 5c. to 50c.; hexagonal; silicate of aluminum, iron, potassium
 and magnesium.
 290A. **Manganophyllite** (Ap. II. p. 37); hexagonal (?); silicate of aluminum, manga-
 291. **Annite**, near Lepidomelane. [nese, magnesium, &c.
 292. **Astrophyllite**, 10c. to \$1.00; orthorhombic; silicate of titanium, iron, man-
 ganese, magnesium, sodium, and aluminum.
 293. **Muscovite**, 5c. to \$1.00; monoclinic; silicate of aluminum and potassium.
 Var. 1. Plumose Mica, 10c. to 50c. 2. Fuschite, 5c. to 50c.
 3. Mariposite, 25c. to \$1.00 (Ap. II., p. 37.)
 294. **Lepidolite**, 5c. to \$2.50; monoclinic; fluo-silicate of aluminum, potassium
 Var. Zinnwaldite, 25c. to \$2.50. [and lithium.
 295. **Cryophyllite**, orthorhombic; fluo-silicate of aluminum, potassium, iron and
 296. **Sarcollite**, tetragonal; silicate of aluminum, calcium and sodium. [lithium.
 297. **Meionite**, 25c. to \$2.00; tetragonal; silicate of aluminum, calcium and sodium.
 298. **Paranthite**, tetragonal; silicate of aluminum and calcium.
 299. **Wernerite**, 5c. to \$2.50; tetragonal; silicate of aluminum, calcium and sodium.
 Var. 1. Algerite, 50c. to \$2.00; 2. Wilsonite, 25c. to \$1.00.
 300. **Ekebergite**, tetragonal; silicate of aluminum, calcium and sodium.
 301. **Mizzonite**, tetragonal; silicate of aluminum, calcium and sodium.
 302. **Dipyre**, 50c. to \$2.00; tetragonal; silicate of aluminum, calcium and sodium.
 303. **Marialite**, tetragonal; silicate of aluminum, calcium and sodium. [potassium.
 304. **Nephelite**, 5c. to \$2.00; hexagonal; silicate of aluminum, sodium and
 Var. Elaeolite; 5c. to 50c. [and sodium.
 304A. **Cancrinite**, 5c. to \$1.00; hexagonal; silico-carbonate of aluminum, calcium
 305. **Sodalite**, 10c. to \$1.00; isometric; silicate and chloride of aluminum and
 sodium.
 305A. **Microsommitte**, (Ap. II., p. 39) orthorhombic; silicate and chloride of alu-
 minum, sodium, calcium and potassium.
 306. **Lapis Lazuli**, 10c. to \$2.50; isometric; silicate of aluminum and calcium
 with sulphide of sodium.

307. **Häüynite**, isometric; silicate of aluminum and sodium with sulphate of calcium.
 308. **Nosite**, isometric; silicate and sulphate of aluminum and sodium. [cium.
 309. **Leucite**, 10c. to \$2.50; tetragonal; silicate of aluminum and potassium.
 309A. **Maskelynite**, (Ap. II., p. 37); isometric; silicate of aluminum, calcium, sodium, and potassium.
 310. **Anorthite**, 10c. to \$1.00; triclinic; silicate of aluminum and calcium.
 311. **Labradorite**, 5c. to \$2.00; triclinic; silicate of aluminum, calcium and sodium.
 312. **Andesite**, triclinic; silicate of aluminum, calcium and sodium. [dium.
 313. **Hyalophane**, monoclinic; silicate of aluminum, potassium and barium.
 314. **Oligoclase**, 5c. to \$2.50; triclinic; silicate of aluminum, calcium and sodium.
 Var. 1. Sunstone, 25c. to \$1.50.
 2. Moonstone (in part), 10c. to \$1.50.
 315. **Albite**, 5c. to \$5.00; triclinic; silicate of aluminum and sodium.
 Var. 1. Moonstone (in part), 10c. to \$1.00. 2. Peristerite, 25c. to \$2.00.
 3. Pericline, 25c. to \$2.00. 4. Cleavelandite, 5c. to 50c.
 316. **Orthoclase**, 5c. to \$5.00; monoclinic; silicate of aluminum and potassium.
 Var. 1. Adularia, 25c. to \$5.00. 2. Cassinite, 10c. to \$1.00.
 3. Sanidin, 25c. to \$1.00. 4. Loxoclase, 25c. to \$1.00.
 5. Obsidian, 5c. to \$1.00. 6. Pearlstone, 10c. to 50c.
 7. Pitchstone, 10c. to 50c.

III.—SUBSILICATES.

319. **Chondrodite**, 10c. to \$2.00; silicate of magnesium.
 Des Cloizeaux has proved that the three types of "Chondrodite" are really three distinct species, as follows:
 I. Humite; orthorhombic.
 II. Chondrodite; monoclinic.
 III. Clinohumite; monoclinic.
 320. **Tourmaline**, 5c. to \$10.00; rhombohedral; a boro-silicate of aluminum, with magnesium, iron, manganese or lithium.
 Var. 1. Pink, Rubellite, 5c. to \$10.00. 2. Blue, Indicolite, 10c. to \$2.00.
 3. Colorless, Achroite. 4. Brown, 5c. to \$5.00. 5. Black, 5c. to \$2.00. 6. Green, 10c. to \$2.50. 7. Green, with pink center, 50c. to \$5.00.
 321. **Gehlenite**, 25c. to 2.00; tetragonal, silicate of aluminum, iron and calcium.
 322. **Andalusite**, 10c. to \$2.50; orthorhombic; silicate of aluminum.
 Var. Chiastolite, 10c. to \$1.00.
 323. **Fibrolite**, 5c. to 50c.; monoclinic; silicate of aluminum.
 323A. **Westanite** (Ap. I., p. 16), a hydrous Fibrolite.
 324. **Cyanite**, 5c. to \$1.00; triclinic; silicate of aluminum.
 325. **Topaz**, 5c. to \$20.00; orthorhombic; fluo-silicate of aluminum. Our stock is rich in choice crystals—see pages 30 and 36.
 326. **Euclase**, \$5.00 to \$20.00; monoclinic; silicate of aluminum and beryllium.
 327. **Datolite**, 10c. to \$2.50; monoclinic; boro-silicate of calcium.
 328. **Guarinite**, orthorhombic; silicate of calcium and titanium.
 329. **Titanite**, 5c. to \$5.00; monoclinic; silicate of calcium and titanium.
 330. **Grothite**, monoclinic; silicate of calcium, titanium, iron, manganese, &c.
 331. **Keilhaute**, 25c. to \$2.50; monoclinic; silicate of calcium, titanium, yttrium, aluminum and iron.
 332. **Tscheffkinit**, massive; silicate of titanium, iron, cerium, &c. [nesium.
 333. **Staurolite**, 5c. to 50c.; orthorhombic; silicate of aluminum, iron and magnesium.
 334. **Schorlomite**, 10c. to \$1.00; massive; silicate of titanium, iron and calcium.
 335. **Sapphirine**, monoclinic; silicate of aluminum, magnesium and iron.
 335A. **Trautwinit**, (Ap. II., p. 56); hexagonal; silicate of chromium, calcium and iron.
 336. **Eulytite**, 50c. to \$5.00; isometric; silicate of bismuth. [iron.
 337. **Atelestite**, monoclinic; arsenate of bismuth.
 338. **Hypochlorite**, massive; quartz with bismutoferrite.
 338A. **Isopyre**, massive; silicate of iron, calcium and aluminum.

B.—HYDROUS SILICATES.

I. GENERAL SECTION OF HYDROUS SILICATES.

339. **Pectolite**, 10c. to \$2.00; monoclinic; hydrous silicate of calcium and sodium.
 340. **Xonaltite**, massive; hydrous silicate of calcium.

- 840A. **Plombierite**, massive; hydrous silicate of calcium.
 841. **Okenite**, orthorhombic; hydrous silicate of calcium.
 841A. **Centrallassite**, massive; hydrous silicate of calcium.
 841B. **Cyanolite**, massive; hydrous silicate of calcium.
 842. **Gyrolite**, massive; hydrous silicate of calcium. [calcium.
 843. **Laumontite**, 5c. to 50c.; monoclinic; hydrous silicate of aluminum and
 844. **Catapleite**, hexagonal; hydrous silicate of zirconium, sodium and calcium.
 845. **Diopase**, 50c. to \$20.00; rhombohedral; hydrous silicate of copper.
 846. **Chrysocolla**, 5c. to \$2.50; massive; hydrous silicate of copper.
 846A. **Resanite** (Ap. II., p. 48); massive; hydrous silicate of copper and iron.
 847. **Alipite**, massive; hydrous silicate of nickel and magnesium.
 848. **Conarite**, 50c. to \$2.50; monoclinic (?); hydrous silicate of nickel.
 849. **Picrosmine**, orthorhombic; hydrous silicate of magnesium.
 849A. **Hydrosilicite**, massive; hydrous silicate of calcium, magnesium, &c.
 850. **Spadaite**, massive; hydrous silicate of magnesium.
 851. **Pyrallolite**,
 852. **Picrophyll**,
 853. **Traversellite**,
 854. **Pitkarandite**,
 855. **Strakonitzite**,
 856. **Monradite**,
 857. **Neolite**, massive; hydrous silicate of magnesium and aluminum.
 858. **Paligorskite**, massive; hydrous silicate of aluminum and magnesium.
 859. **Xylotile**, 25c. to \$1.00; massive; hydrous silicate of iron and magnesium.
 860. **Anthosiderite**, massive; hydrous silicate of iron.
 861. **Calamine**, 5c. to \$3.50; orthorhombic; hydrous silicate of zinc.
 861A. **Moresnetite**, hydrous silicate of zinc and aluminum.
 862. **Villarsite**, orthorhombic; hydrous silicate of magnesium and iron.
 863. **Prehnite**, 5c. to \$2.50; orthorhombic; hydrous silicate of aluminum and
 864. **Ohloastrorite**, 5c. to 50c.; massive; an impure Prehnite. [calcium.
 865. **Tritomite**, isometric; hydrous silicate of cerium, lanthanum, &c.
 866. **Thorite**, 25c. to \$5.00; isometric; hydrous silicate of thorium.
 Var. **Orangeite**, \$1.00 to \$5.00.
 867. **Cerite**, 10c. to \$1.50; orthorhombic; hydrous silicate of cerium, lanthanum,
 and didymium. [calcium, etc.
 868. **Erdmannite**, massive; hydrous silicate of cerium, thorium, beryllium,
 869. **Pyrosmalite**, 50c. to \$3.50; hexagonal; hydrous silicate and chloride of iron
 and manganese. [potassium.
 870. **Apophyllite**, 5c. to \$5.00; tetragonal; hydrous silicate of calcium and
 870A. **Chalcomorphite**, (Ap. II., p. 11); hexagonal; hydrous silicate of calcium and
 aluminum.
 871. **Edingtonite**, tetragonal; hydrous silicate of aluminum and barium.
 872. **Gismondite**, 50c. to \$5.00; orthorhombic; hydrous silicate of calcium and
 aluminum. [manganese and iron.
 873. **Carpholite**, 50c. to \$2.50; orthorhombic; hydrous silicate of aluminum,
 874. **Allophane**, 25c. to \$1.00; massive; hydrous silicate of aluminum.
 875. **Collyrite**, massive; hydrous silicate of aluminum.
 875A. **Dillnite**, massive; hydrous silicate of aluminum.
 876. **Schrötterite**, massive; hydrous silicate of aluminum.
 876A. **Scarbroite**, massive; hydrous silicate of aluminum.
 876B. **Uranophane**, orthorhombic (?); hydrous silicate of uranium, calcium, etc.

II.—ZEOLITE SECTION.

877. **Thomsonite**, 5c. to \$1.50; orthorhombic; hydrous silicate of aluminum,
 calcium, and sodium. [sodium, &c.
 877A. **Rauite** (Ap. II., p. 47), massive; hydrous silicate of aluminum, calcium,
 878. **Natrolite**, 10c. to \$2.00; orthorhombic; hydrous silicate of aluminum and
 sodium. [calcium.
 879. **Scolecite**, 25c. to \$2.50; monoclinic; hydrous silicate of aluminum and
 880. **Ellagitite**, a ferriferous natrolite. [and sodium.
 881. **Mesolite**, 10c. to \$2.00; monoclinic; hydrous silicate of aluminum, calcium

882. **Levynite**, 50c. to \$2.50; rhombohedral; hydrous silicate of aluminum and calcium.
883. **Analcite**, 10c. to \$2.50; isometric; hydrous silicate of aluminum and sodium.
884. **Eudnophite**, orthorhombic; hydrous silicate of aluminum and sodium.
885. **Faujasite**, 25c. to \$2.00; isometric; hydrous silicate of aluminum, calcium and sodium.
886. **Chabazite**, 5c. to \$3.50; rhombohedral; hydrous silicate of aluminum, calcium and potassium.
 Var. 1. **Acadialite**, 5c. to \$2.00.
 2. **Phacolite**, 25c. to \$3.50.
 3. **Haydenite**, 10c. to \$1.50.
887. **Gmelinite**, 25c. to \$3.50; rhombohedral, hydrous silicate of aluminum, calcium and sodium.
888. **Herschelite**, 50c. to \$2.50; orthorhombic; hydrous silicate of aluminum.
- 888A. **Seebachite** (Ap. II., p. 50), 50c. to \$2.50; orthorhombic; hydrous silicate of aluminum, sodium and calcium.
889. **Phillipsite**, 25c. to \$2.50, monoclinic; hydrous silicate of aluminum.
890. **Harmotome**, 25c. to \$2.50; monoclinic; hydrous silicate of aluminum and sodium.
891. **Hypostilbite**, massive; hydrous silicate of aluminum and calcium. [barium.]
892. **Stilbite**, 5c. to \$2.50; orthorhombic; hydrous silicate of aluminum and calcium.
- 892A. **Foresite** (Ap. II., p. 22); orthorhombic; hydrous silicate of aluminum and sodium.
893. **Epistilbite**, 50c. to \$3.50; monoclinic; hydrous silicate of aluminum, calcium and sodium.
894. **Heulandite**, 5c. to \$2.00; monoclinic; hydrous silicate of aluminum and sodium.
895. **Brewsterite**, monoclinic; hydrous silicate of aluminum, barium and strontium.
896. **Mordenite**, massive; hydrous silicate of aluminum, calcium and sodium.
897. **Sloanite**, orthorhombic; hydrous silicate of aluminum and calcium.
898. **Sasparite**, massive; hydrous silicate of aluminum, calcium, potassium and magnesium.

III.—MARGAROPHYLLITE SECTION.

399. **Talc**, 5c. to 50c.; orthorhombic; hydrous silicate of magnesium.
400. **Pyrophyllite**, 5c. to \$2.00; orthorhombic; hydrous silicate of aluminum.
401. **Pihlrite**, massive; hydrous silicate of aluminum, &c.
402. **Sepiolite**, 5c. to 50c.; massive; hydrous silicate of magnesium.
403. **Aphrodite**, massive; hydrous silicate of magnesium.
404. **Cimolite**, massive; hydrous silicate of aluminum.
- 404A. **Sphragidite**, massive; hydrous silicate of aluminum, iron, &c.
- 404B. **Ehrenbergite**, massive; hydrous silicate of aluminum, iron, &c.
- 404C. **Anauxite**, massive; hydrous silicate of aluminum, iron, &c.
- 404D. **Portite**, orthorhombic; hydrous silicate of aluminum, magnesium, &c.
- 404E. **Nefedieffite** (Ap. II. p. 41); massive; hydrous silicate of aluminum and sodium.
405. **Smectite**, massive; hydrous silicate of aluminum, &c. [magnesium.]
406. **Montmorillonite**, 5c. to 50c.; massive; hydrous silicate of aluminum.
- 406A. **Razoumoffskin**, 25c. to \$1.00; massive; hydrous silicate of aluminum.
407. **Stilpnomelane**, 10c. to \$2.50; massive; hydrous silicate of iron and sodium.
 Var. **Chalcodite**; 10c. to \$2.50.
408. **Chloropal**, massive; hydrous silicate of iron.
409. **Glauconite**, 10c. to 50c.; massive; hydrous silicate of iron, potassium, &c.
410. **Celadonite**, 25c. to \$1.00; massive; hydrous silicate of iron and potassium.
411. **Serpentine**, 5c. to \$1.00; massive; hydrous silicate of magnesium.
 Var. 1. (a) **Precious**, 10c. to \$1.00; (b) **Common**, 5c. to 25c. 2. **Retinalite**.
 3. **Porcellophite**, 10. to 50c. 4. **Bowenite**, 10c. to 50c.
 5. **Antigorite**, 10c. to 50c. 6. **Williamsite**, 5c. to \$1.00.
 7. **Marmolite**, 5c. to 50c. 8. **Thermophyllite**. [to 50c.]
 9. **Chrysotile**, 5c. to 50c. 10. **Pierolite**, 5c. to 50c. **Baltimorite**, 10c.
412. **Bastite**, orthorhombic(?) ; hydrous silicate of magnesium.
- 412A. **Refdanskite**, massive; hydrous silicate of magnesium, nickel, iron, &c.
413. **Deweyllite**, 5c. to 50c.; massive; hydrous silicate of magnesium.
414. **Cerolite**, massive; hydrous silicate of magnesium. [magnesium.]
- 414A. **Limbachite**, (Ap. II., p. 34), massive; hydrous silicate of aluminum and sodium.

415. **Hydrophite**, massive; hydrous silicate of magnesium and iron.
- 415A. **Dermatin**, massive; hydrous silicate of magnesium and iron. (?) [aluminum.
- 415B. **Aquacreptite**, (Ap. I., p. 2), massive; hydrous silicate of magnesium, iron and
416. **Genthite**, 10c. to \$1.00; massive; hydrous silicate of nickel and magnesium.
- 416A. **Garnierite**, (Ap. II., p. 23), 5c. to 50c.; massive; hydrous silicate of nickel and magnesium.
417. **Saponite**, massive; hydrous silicate of magnesium and aluminum.
418. **Pholerite**, 10c. to 50c.; orthorhombic; hydrous silicate of aluminum:
- 418A. **Teratolite**, massive; hydrous silicate of aluminum and iron.
419. **Kaolinite**, 5c. to 25c.; orthorhombic; hydrous silicate of aluminum.
420. **Halloysite**, 5c. to 50c., massive; hydrous silicate of aluminum.
421. **Samoite**, massive; hydrous silicate of aluminum.
422. **Pinite**, 10c. to \$5.00; massive; hydrous silicate of aluminum and potassium.
Var. 1. Gieseckite, 50c. to \$2.50; 2. Agalmatolite, 50c. to \$5.00.
423. **Catasplite**, massive; hydrous silicate of aluminum, potassium and magnesium.
424. **Biharite**, massive, hydrous silicate of magnesium, aluminum, calcium and potassium.
425. **Palagonite**, massive; hydrous silicate of aluminum, iron, calcium and magnesium. [magnesium.
426. **Fahlunite**, 25c. to \$1.00; massive; hydrous silicate of aluminum, iron and
427. **Groppite**, massive; hydrous silicate of aluminum, magnesium and potassium.
428. **Voigtite**, massive; hydrous silicate of aluminum, iron and magnesium.
429. **Margarodite**, 10c. to 50c.; monoclinic; hydrous muscovite. [&c.
- 429A. **Gilbertite**, 25c. to \$1.00; massive; hydrous silicate of aluminum, potassium.
430. **Damourite**, 5c. to 50c.; massive; hydrous silicate of aluminum and potassium.
431. **Paragonite**, massive; hydrous silicate of aluminum and sodium.
- 431A. **Ivigtite**, (Ap. I., p. 7), massive; hydrous silicate of aluminum, sodium and iron.
432. **Euphyllite**, massive; hydrous silicate of aluminum, sodium, potassium, &c.
433. **Oellacherite**, massive; hydrous silicate of aluminum, potassium, magnesium, barium, &c. [potassium.
434. **Cookeite**, 10c. to 50c.; massive; hydrous silicate of aluminum, lithium and
435. **Hisingerite**, massive; hydrous silicate of iron.
436. **Ekmannite**, massive; hydrous silicate of iron and manganese.
437. **Neotocite**, massive; hydrous silicate of manganese, &c. [iron.
438. **Stübelite**, massive; hydrous silicate of manganese, copper, aluminum and
439. **Gillingite**, massive; hydrous silicate of iron, &c.
440. **Jollyte**, massive; hydrous silicate of aluminum, iron and magnesium.
441. **Epichlorite**, massive; hydrous silicate of magnesium, aluminum and iron.
442. **Polyhydrite**, massive; hydrous silicate of iron, aluminum and manganese.
- 442B. **Hygrophilite**, (Ap. II., p. 29, et. al.); massive; hydrous silicate of aluminum, iron, potassium, &c.
443. **Lillite**, massive; hydrous silicate of iron and calcium.
444. **Chlorite-like Mineral**, massive; hydrous silicate of iron and aluminum.
445. **Pyrosclerite**, orthorhombic or monoclinic; hydrous silicate of magnesium, aluminum, iron and chromium. [inum and iron.
- 445A. **Vermiculite**, 5c. to 50c.; hexagonal; hydrous silicate of magnesium, aluminum and iron.
- 445C. **Hallite** (Ap. II., p. 26), hexagonal (?); hydrous silicate of magnesium, aluminum and iron. [inum and iron.
- 445D. **Vaalite** (Ap. II., p. 58), monoclinic; hydrous silicate of magnesium, aluminum and iron.
446. **Chonicerite**, massive; hydrous silicate of magnesium, aluminum, iron and calcium. [inum and iron.
447. **Jefferisite**, 5c. to \$1.00; orthorhombic; hydrous silicate of magnesium, aluminum.
- 447A. **Kerrite** (Ap. II., p. 31), massive; hydrous silicate of magnesium and aluminum.
- 447B. **Maconite** (Ap. II., p. 36), massive; hydrous silicate of aluminum, iron, magnesium and potassium.
448. **Penninite**, 25c. to \$2.50; rhombohedral; hydrous silicate of magnesium and Var. Kämmererite, 25c. to \$2.50. [aluminum.
449. **Delessite**, 25c. to \$2.00; massive; hydrous silicate of magnesium, aluminum and iron.
450. **Ripidolite**, 5c. to \$2.50; monoclinic; hydrous silicate of magnesium and aluminum. [and aluminum.
451. **Leuchtenbergite**, \$1.00 to \$5.00; hexagonal; hydrous silicate of magnesium

452. **Prochlorite**, 5c. to 50c.; hexagonal; hydrous silicate of aluminum, iron and
 453. **Chlorite-like Mineral**, from N. C. [magnesium.
 454. **Aphrosiderite**, 10c. to 50c.; hexagonal; hydrous silicate of iron and alu-
 minum. [magnesium.
 454A. **Strigovite** (Ap. II., p. 53), hexagonal; hydrous silicate of aluminum, iron and
 455. **Metachlorite**, massive; hydrous silicate of iron and aluminum.
 456. **Cronstedtite**, 25c. to \$2.50; rhombohedral; hydrous silicate of iron, man-
 ganese and magnesium. [nesium.
 457. **Corundophilite**, monoclinic; hydrous silicate of aluminum, iron and mag-
 458. **Chloritoid**, monoclinic; hydrous silicate of iron and aluminum.
 458A. **Phyllite**, 5c. to 25c.; monoclinic (?); hydrous silicate of aluminum, iron and
 manganese. [iron and magnesium.
 458B. **Grochavite** (Ap. II., p. 25), monoclinic (?); hydrous silicate of aluminum,
 459. **Margarite**, 5c. to \$1.00; orthorhombic; hydrous silicate of aluminum and
 calcium.
 459A. **Dudleyite** (Ap. II., p. 17), hydrous silicate of aluminum, magnesium, iron, &c.
 459B. **Willcoxite** (Ap. II., p. 61), hydrous silicate of aluminum, magnesium, sodium,
 potassium and iron.
 460. **Thuringite**, massive; hydrous silicate of aluminum and iron.
 461. **Seybertite**, 5c. to 50c.; monoclinic; hydrous silicate of aluminum, magne-
 Var. Clintonite, 5c. to 50c. [sium, calcium and iron
 462. **Wolchonskoite**, massive; hydrous silicate of chromium, aluminum and iron
 463. **Selwynite**, massive; hydrous silicate of aluminum, chromium and magnesium.
 464. **Chrome Ochre**, massive; hydrous silicate of aluminum, chromium and iron.
 465. **Miloschite**, massive; hydrous silicate of aluminum and chromium.
 466. **Pimelite**, massive; hydrous silicate of aluminum, iron, nickel and magnesium.
 467. **Chlorophæite**, massive; hydrous silicate of iron.
 468. **Klipsteinite**, massive; hydrous silicate of manganese and iron.
 469. **Chamoisite**, massive; hydrous silicate of iron and aluminum.
 Var. Berthierine; 5c. to 50c. [and zirconium.
 470. **Alvite**, tetragonal; hydrous silicate of aluminum, iron, yttrium, thorium
 470A. **Picrofuite**, massive; probably a mixture of fluorite with a magnesian silicate.

II.—TANTALATES, COLUMBATES.

471. **Pyrochlore**, 50c. to \$2.50; isometric; columbate of calcium, cerium, &c.
 471A. **Koppite** (Ap. II., p. 32), isometric; columbate of calcium, cerium, &c.
 472. **Microlite**, 25c. to \$5.00; isometric; tantalate of calcium, manganese and mag-
 nesium. [gane.
 473. **Tantalite**, 50c. to \$2.50; orthorhombic; columbo-tantalate of iron and man-
 474. **Columbite**, 10c. to \$1.50; orthorhombic; tantalio-columbate of iron and man-
 475. **Tapiolite**, tetragonal; tantalate of iron. [gane.
 476. **Hielmite**, massive; stannio-tantalate of iron, uranium and yttrium.
 477. **Yttrotantalite**, orthorhombic; columbo-tantalate of yttrium, cerium, cal-
 cium, iron, &c. [iron, &c.
 478. **Samarskite**, 10c. to \$2.50; orthorhombic; columbate of yttrium, uranium,
 478A. **Nohlite** (Ap. II., p. 41), massive; hydrous columbate of yttrium, uranium,
 iron, &c. [titanium, &c.
 479. **Euxenite**, 25c. to \$5.00; orthorhombic; columbo-tantalate of yttrium, uranium
 480. **Æschynite**, 50c. to \$2.50; orthorhombic; titano-columbate of yttrium,
 cerium, lanthanum, &c. [uranium, &c.
 481. **Polycrase**, 50c. to \$2.50; orthorhombic; columbate of titanium, yttrium,
 482. **Polymignite**, orthorhombic; titanate of zirconium, iron, yttrium, cerium, &c.
 483. **Fergusonite**, 25c. to \$5.00; tetragonal; columbate of yttrium.
 484. **Adelpholite**, tetragonal; hydrous columbate of iron and manganese.
 485. **Mengite**, orthorhombic; titanate of zirconium and iron.
 486. **Rutherfordite**, monoclinic; titanate of calcium, cerium, &c.

3. PHOSPHATES, ARSENATES, ANTIMONATES, NITRATES.

A. PHOSPHATES, ARSENATES, ANTIMONATES.

I. ANHYDROUS.

490. **Xenotime**, 25c. to \$3.50; tetragonal; phosphate of yttrium.

491. **Cryptolite**, tetragonal; phosphate of cerium. [fluoride of calcium.
 492. **Apatite**, 5c. to \$2.50; hexagonal; phosphate of calcium with chloride or
 Var. 1. Asparagus stone, 25c. to \$2.00; 2. Francolite, 50c. to \$2.50.
 498. **Pyromorphite**, 10c. to \$3.50; hexagonal; phosphate and chloride of lead.
 494. **Mimetite**, 25c. to \$3.50; hexagonal; arsenate and chloride of lead.
 Var. Campylite; 25c. to \$3.50.
 495. **Wagnerite**, 25c. to \$2.50; monoclinic; fluo-phosphate of magnesium.
 Var. Kjerulfine; 25c. to \$2.50. (Ap. II., p. 31, and III., p. 130.)
 496. **Monazite**, 10c. to \$3.50; monoclinic; phosphate of cerium, lanthanum,
 didymium and thorium.
 496A. **Korarfeite** (Ap. II., p. 32), fluo-phosphate of cerium.
 497. **Turnerite**, \$1.00 to \$3.50; variety of Monazite. [lithium.
 498. **Triphylite**, 10c. to \$1.00; orthorhombic; phosphate of iron, manganese and
 Var. I. Lithiophilite; 10c. to \$1.00; a manganese variety (Ap. III.,
 p. 124.)
 2. Natrophilite; a sodium-manganese variety. (A. J. S., March '90.)
 499. **Triplite**, 10c. to 50c.; monoclinic; fluo-phosphate of iron and manganese.
 500. **Hopelite**, orthorhombic; hydrous phosphate of zinc.
 501. **Berzeliite**, massive; arsenate of calcium, magnesium and manganese.
 502. **Carminite**, orthorhombic; arsenate of iron and lead.
 503. **Amblygonite**, 5c. to 50c.; fluo-phosphate of aluminum and lithium.
 503A. **Durangite** (Ap. I., p. 4), 25c. to \$2.50; monoclinic; fluo-arsenate of alu-
 minum, iron, sodium, &c. [calcium.
 504. **Herderite**, \$1.00 to \$5.00; orthorhombic; fluo-phosphate of beryllium and
 505. **Monimolite**, tetragonal; antimonate of lead, iron, manganese, calcium and
 506. **Romeite**, tetragonal; antimonate of calcium. [magnesium.
 507. **Ammiolite**, massive; antimonate of copper with cinnabar. [and silver.
 507A. **Rivotite**, (Ap. II., p. 48), massive; antimonate and carbonate of copper
 508. **Arsenate of Nickel**, massive; ($\text{Ni}_3\text{As}_2\text{O}_{10}$).
 509. **Arsenate of Nickel**, Xanthosite; massive; ($\text{Ni}_3\text{As}_2\text{O}_8$). [lead.
 510. **Nadorite** (Ap. I., p. 11), 10c. to \$1.50; orthorhombic; chloro-antimonate of

II.—HYDROUS.

515. **Stercorite**, massive; hydrous phosphate of sodium and ammonium.
 516. **Struvite**, 50c. to \$2.50; orthorhombic, hydrous phosphate of magnesium and
 517. **Haidingerite**, orthorhombic; hydrous arsenate of calcium. [ammonium.
 518. **Brushite**, monoclinic; hydrous phosphate of calcium. [carbonate of calcium.
 518A. **Kollophan**, (Ap. I., p. 9), hydrous phosphate of calcium, with 8 per cent.
 519. **Metabrushite**, 25c. to \$2.50; monoclinic; hydrous phosphate of calcium.
 520. **Pharmacolite**, 50c. to \$5.00; monoclinic; hydrous arsenate of calcium.
 520A. **Picropharmacolite** (Ap. II., p. 44), hydrous arsenate of calcium and mag-
 520B. **Isoclasite** (Ap. I., p. 7), monoclinic; hydrous phosphate of calcium. [nesium.
 520C. **Wapplerite** (Ap. II., p. 60), triclinic; hydrous arsenate of calcium and mag-
 521. **Churchite**, monoclinic; hydrous phosphate of cerium and calcium. [nesium.
 522. **Hoernesite**, monoclinic; hydrous arsenate of magnesium.
 523. **Roesslerite**, massive; hydrous arsenate of magnesium.
 523A. **Bobierite**, monoclinic; hydrous phosphate of magnesium.
 524. **Vivianite**, 5c. to \$2.00; monoclinic; hydrous phosphate of iron.
 Beraunite and Eleonorite are near Vivianite. (See Ap. III., p. 13.)
 525. **Symplectite**, monoclinic; hydrous arsenate of iron.
 526. **Erythrite**, 10c. to \$3.50; monoclinic; hydrous arsenate of cobalt. [magnesium.
 526A. **Roselite**, \$2.50 to \$20.00; triclinic; hydrous arsenate of cobalt, calcium and
 526B. **Lavendulan**, 25c. to \$2.50; massive; hydrous arsenate of cobalt, nickel and
 copper. [S., XXIV., p. 476.)
 526C. **Winklerite** (Ap. II., p. 61), massive; hydrous oxide of cobalt and nickel, (A. J.
 527. **Annabergite**, 25c. to \$2.50; monoclinic; hydrous arsenate of nickel.
 528. **Forbesite**, massive; hydrous bibasic arsenate of nickel and cobalt.
 529. **Cabrerite**, monoclinic; hydrous arsenate of nickel, cobalt and magnesium
 530. **Kottigite**, monoclinic; hydrous arsenate of zinc, cobalt and nickel.
 531. **Hureaulite**, monoclinic; hydrous phosphate of manganese and iron.

532. **Chondrarsenite**, massive; hydrous arsenate of manganese.
 533. **Trichalcite**, massive; hydrous arsenate of copper.
 534. **Thrombolite**, massive; hydrous phosphate of copper.
 535. **Libethenite**, 50c. to \$3.50; orthorhombic; hydrous phosphate of copper.
 536. **Olivenite**, 10c. to \$2.50; orthorhombic; hydrous arsenate of copper. See
 537. **Adamite**, 25c. to \$5.00; orthorhombic; hydrous arsenate of zinc. [page 37.
 538. **Conichalcite**, 10c. to \$3.50; massive; hydrous arsenate of copper and calcium.
 See page 38.
 539. **Bayldonite**, massive; hydrous arsenate of copper and lead.
 540. **Euchroite**, \$1.00 to \$10.00; orthorhombic; hydrous arsenate of copper.
 541. **Tagilite**, monoclinic; hydrous phosphate of copper. [and zinc
 541A. **Veszelyite** (Ap. II., p. 59), triclinic; hydrous arseno-phosphate of copper
 542. **Liroconite**, 50c. to \$3.50; monoclinic; hydrous arsenate of copper and
 aluminum.
 543. **Pseudomalachite**, 50c. to \$5.00; monoclinic; hydrous phosphate of copper.
 544. **Erinite**, 25c. to \$2.50; massive (?); hydrous arsenate of copper. See page 37.
 545. **Cornwallite**, massive; hydrous arsenate of copper.
 546. **Tyrolite**, 10c. to \$3.50; orthorhombic; hydrous arsenate of copper. See
 page 38. [page 39.
 547. **Clinoclasite**, 10c. to \$5.00; monoclinic; hydrous arsenate of copper. See
 548. **Chalcophyllite**, 50c. to \$3.50; rhombohedral; hydrous arsenate of copper.
 [See page 39.
 549. **Berlinite**, massive; hydrous phosphate of aluminum.
 550. **Callainite**, massive; hydrous phosphate of aluminum.
 550A. **Zepharovichite** (Ap. I., p. 17), massive; hydrous phosphate of aluminum.
 551. **Lazulite**, 5c. to \$2.00; monoclinic; hydrous phosphate of aluminum and
 magnesium. [inum.
 552. **Barrandite**, 50c. to \$2.50; massive; hydrous phosphate of iron and alum-
 553. **Scorodite**, 10c. to \$2.50; orthorhombic; hydrous arsenate of iron. See
 page 42.
 554. **Wavellite**, 5c. to \$2.50; orthorhombic; hydrous phosphate of aluminum.
 554A. **Kapnicite**, probably Wavellite.
 554B. **Planerite**, massive; hydrous phosphate of aluminum, copper and iron.
 554C. **Coeruleolactite** (Ap. I., p. 3, and Ap. II., p. 13) massive; hydrous phosphate
 of aluminum and copper. [and magnesium.
 555. **Trolleite**, massive; hydrous phosphate of aluminum. [and lead.
 556. **Plumbogummite**, 25c. to \$2.50; massive; hydrous phosphate of aluminum
 557. **Calcioferite**, monoclinic; hydrous phosphate of iron, calcium, aluminum
 and magnesium.
 558. **Pharmacosiderite**, 10c. to \$2.50; isometric; hydrous arsenate of iron. (See
 559. **Cirrolite**, massive; hydrous phosphate of calcium and aluminum. [page 41.)
 560. **Childrenite**, 50c. to \$3.50; orthorhombic; hydrous phosphate of iron, alum-
 Var. **Eosphorite**—see Ap. III., p. 24. [inum and manganese.
 561. **Attacolite**, massive; hydrous phosphate of aluminum, calcium, iron and
 562. **Augelite**, massive; hydrous phosphate of aluminum. [manganese.
 563. **Turquois**, 10c. to \$3.50; massive; hydrous phosphate of aluminum.
 564. **Peganite**, orthorhombic; hydrous phosphate of aluminum.
 565. **Fischerite**, orthorhombic; hydrous phosphate of aluminum.
 565A. **Variscite**, 10c. to \$2.00; hydrous phosphate of aluminum.
 Ap. III., p. 128—now considered a variety of Callainite.
 566. **Tavistockite**, massive; hydrous phosphate of aluminum and calcium.
 567. **Chenevixite**, 25c. to \$2.50; massive; hydrous arsenate of copper and iron.
 568. **Dufrenite**, 5c. to \$2.50; orthorhombic; hydrous phosphate of iron.
 569. **Cacoxenite**, 50c. to \$2.50; massive; hydrous phosphate of iron. [cium.
 570. **Arseniosiderite**, 25c. to \$2.50; massive; hydrous arsenate of iron and cal-
 571. **Evansite**, 25c. to \$2.50; massive; hydrous phosphate of aluminum.
 572. **Torbernite**, 10c. to \$3.50; tetragonal; hydrous phosphate of uranium and
 copper. [copper.
 572A. **Zeunerite** (Ap. II., p. 62), tetragonal; hydrous arsenate of uranium and
 573. **Autunite**, 10c. to \$3.50; orthorhombic; hydrous phosphate of uranium and
 calcium. [nium.
 573A. **Walpurgite** (Ap. I., p. 16), triclinic; hydrous arsenate of bismuth and ura-
 573B. **Trögerite** (Ap. I., p. 16), monoclinic; hydrous arsenate of uranium.

- 578C. **Uranospinite** (Ap. II., p. 58), orthorhombic; hydrous arsenate of uranium and calcium. [nesium.]
574. **Amphithalite**, massive; hydrous phosphate of aluminum, calcium and magnesium.
575. **Sphaerite**, 50c. to \$2.00; massive; hydrous phosphate of aluminum.
576. **Borickite**, 50c. to \$2.50; hydrous phosphate of iron and calcium.
577. **Rhagite** (Ap. II., p. 48), isometric (?); hydrous arsenate of bismuth.
580. **Diadochite**, 25c. to \$2.00; massive; hydrous phosphate and sulphate of iron.
581. **Pitticite**, massive; hydrous arsenate and sulphate of iron. [lead.]
582. **Bendantite**, rhombohedral; hydrous phosphate and sulphate of iron and nickel.
583. **Lindackerite**, orthorhombic; hydrous arsenate and sulphate of copper and nickel. [phate of aluminum and calcium.]
584. **Svanbergite**, 25c. to \$2.50; rhombohedral; hydrous phosphate and sulphate of iron.
585. **Ficinite**, monoclinic; hydrous phosphate and sulphate of iron and manganese.
586. **Bindheimite**, massive; hydrous antimonate of lead.
587. **Stubioferite** (Ap. II., p. 58), massive; hydrous antimonate of iron.

B.—NITRATES.

590. **Nitre**, orthorhombic; nitrate of potassium.
591. **Soda Nitre**, rhombohedral; nitrate of sodium.
592. **Nitrocalcite**, massive; hydrous nitrate of calcium.
593. **Nitromagnesite**, massive; nitrate of magnesium.

IV.—BORATES.

594. **Sassolite**, triclinic; boracic acid.
595. **Szabelyite**, massive; hydrous borate of magnesium.
- 595A. **Ludwigite** (Ap. II., p. 35), 25c. to \$1.50; massive; borate of iron and magnesium. [magnesium.]
- 595B. **Sussexite** (Ap. I., p. 15), 50c. to \$2.00; hydrous borate of manganese and magnesium.
596. **Hydroboracite**, massive; hydrous borate of calcium and magnesium.
597. **Boracite**, 10c. to \$2.50; isometric; borate and chloride of magnesium.
- 597A. **Huyssenite**, massive; borate of magnesium and iron.
598. **Rhodizite**, isometric; supposed to be lime boracite.
- 598A. **Lüneburgite** (Ap. I., p. 10), phospho-borate of magnesium.
599. **Borax**, 10c. to \$2.00; monoclinic; hydrous borate of sodium.
600. **Bechillite**, massive; hydrous borate of calcium.
- 600A. **Priceite** (Ap. II., p. 45), 25c. to \$1.50; massive; hydrous borate of calcium.
601. **Howlite**, 25c. to \$2.00; orthorhombic(?); hydrous boro-silicate of calcium.
- 601A. **Winkworthite** (Ap. I., p. 17), mixture of howlite and gypsum(?).
602. **Ulexite**, 10c. to \$2.00; massive; hydrous borate of calcium and sodium.
603. **Cryptomorphite**, massive; hydrous borate of calcium and sodium.
604. **Larderellite**, massive; hydrous borate of ammonium.
605. **Lagonite**, massive; hydrous borate of iron.
606. **Warwickite**, 5c. to \$1.00; monoclinic; boro-titanate of magnesium and iron.

V.—TUNGSTATES, MOLYBDATES, VANADATES.

610. **Wolframite**, 5c. to \$2.50; monoclinic; tungstate of iron and manganese.
611. **Hübnerite**, 10c. to \$2.50; orthorhombic; tungstate of manganese.
We have terminated crystals from Colorado.
612. **Ferberite**, massive; tungstate of iron and manganese.
613. **Megabasite**, 25c. to \$2.50; orthorhombic; tungstate of iron and manganese.
614. **Scheelite**, 25c. to \$2.50; tetragonal; tungstate of calcium.
615. **Cuproscheelite**, massive; tungstate of calcium and copper.
- 615A. **Cuprotungstite**, (Ap. II., p. 14), massive; tungstate of copper.
616. **Stolzite**, 50c. to \$5.00; tetragonal; tungstate of lead.
617. **Wulfenite**, 5c. to \$10.00; tetragonal; molybdate of lead.
We have a fine stock. See page 33.
- 617A. **Eosite**, (Ap. I., p. 5), tetragonal; vanadio-molybdate of lead(?).
618. **Pateraita**, massive; molybdate of cobalt.

619. **Decheinte**, massive; vanadate of lead and zinc.
 620. **Descloizite**, 5c. to \$5.00; orthorhombic; hydrous vanadate of lead and zinc.
 Var. **Cuprodescloizite**; 25c. to \$2.00. See page 81.
 621. **Vanadinite**, 5c. to \$10.00; hexagonal; chloro-vanadate of lead.
 We have a very complete stock. See page 84.
 622. **Volborthite**, hexagonal; hydrous vanadate of copper.
 622A. **Vanadate** of lime and copper.
 622B. **Vanadinite** (Ap. I., p. 16), silico-vanadate of calcium.
 623. **Chileite**, massive; vanadate of lead and copper.
 623A. **Vanadate** from the Lake Superior Copper Region.
 624. **Pucherite** (Ap. I., p. 12), 50c. to \$3.50; orthorhombic; vanadate of bismuth.
 624A. **Uranosphaerite** (Ap. II., p. 57), massive; hydrous uranate of bismuth.

6. SULPHATES, CHROMATES, TELLURATES.

I.—ANHYDROUS.

625. **Sulphatite**, sulphuric acid.
 626. **Taylorite**, massive; sulphate of potassium and ammonium.
 627. **Apthitalite**, orthorhombic; sulphate of potassium.
 628. **Misenite**, massive; hydrous sulphate of potassium.
 629. **Thenardite**, 10c. to \$1.00; orthorhombic; sulphate of sodium.
 630. **Barite**, 5c. to \$5.00; orthorhombic; sulphate of barium.
 631. **Celestite**, 5c. to \$5.00; orthorhombic; sulphate of strontium.
 632. **Anhydrite**, 5c. to \$1.00; orthorhombic; sulphate of calcium.
 633. **Anglesite**, 5c. to \$3.50; orthorhombic; sulphate of lead.
 634. **Zinkosite**, orthorhombic; sulphate of zinc.
 634A. **Hydrocyanite**, (Ap. II., p. 29), orthorhombic; sulphate of copper.
 634B. **Dolerophanite**, (Ap. II., p. 17), monoclinic; sulphate of copper.
 635. **Leadhillite**, 50c. to \$5.00; orthorhombic; sulpho-carbonate of lead.
 636. **Caledonite**, 25c. to \$3.50; monoclinic; sulphate of lead and copper.
 637. **Dreelite**, rhombohedral; sulphate of barium and calcium.
 638. **Susannite**, rhombohedral; sulpho-carbonate of lead.
 639. **Connellite**, \$5.00; hexagonal; chloro-sulphate of copper.
 640. **Glauberite**, 10c. to \$1.00; monoclinic; sulphate of sodium and calcium.
 641. **Lanarkite**, \$1.00 to \$3.50; sulphate of lead.
 642. **Crocoite**, 10c. to \$10.00; monoclinic; chromate of lead.
 643. **Phenicochroite**, 50c. to \$2.50; orthorhombic; chromate of lead.
 644. **Vauquelinite**, 50c. to \$2.50; monoclinic; chromate of lead and copper.
 644A. **Laxmannite**, (Ap. I., p. 9); monoclinic; phospho-chromate of lead and copper.
 645. **Jossaite**, \$1.00 to \$5.00; orthorhombic; chromate of lead and zinc.
 646. **Pettkoite**, isometric; sulphate of iron.
 647. **Alumian**, cryst. (?); sulphate of aluminum. (?)

II.—HYDROUS.

650. **Mascagnite**, orthorhombic; hydrous sulphate of ammonium.
 651. **Boussingaultite**, orthorhombic; hydrous sulphate of ammonium and magnesium. [sium].
 652. **Lecontite**, orthorhombic; hydrous sulphate of ammonium, sodium and potassium. [sium].
 652A. **Guanoovulite** (Ap. II., p. 64), massive; hydrous sulphate of ammonium and potassium. [potassium].
 653. **Mirabilite**, monoclinic; hydrous sulphate of sodium. [calcium].
 654. **Gypsum**, 5c. to \$2.50; monoclinic; hydrous sulphate of calcium.
 Var. 1. **Selenite**, 5c. to \$2.50; 2. **Satin Spar**, 5c. to \$1.00; 3. **Alabaster**, 10c. to \$1.00.
 655. **Kieserite**, orthorhombic; hydrous sulphate of magnesium.
 656. **Polyhalite**, 10c. to \$1.00; orthorhombic; hydrous sulphate of calcium, magnesium and potassium. [calcium].
 656A. **Syngenite** (Ap. II., p. 54), monoclinic; hydrous sulphate of potassium and calcium.
 657. **Mamanite**, massive; hydrous silicate of calcium, magnesium and potassium.

658. **Picromerite**, 10c. to \$1.00; monoclinic; hydrous sulphate of potassium and magnesium.
659. **Blødite**, massive; hydrous sulphate of sodium and magnesium.
660. **Loewite**, tetragonal; hydrous sulphate of sodium and magnesium.
661. **Epsomite**, 10c. to \$1.00; orthorhombic; hydrous sulphate of magnesium.
662. **Tauriscite**, orthorhombic; hydrous sulphate of iron.
- 662A. **Tectite**, orthorhombic; hydrous sulphate of iron.
663. **Fauscite**, orthorhombic; hydrous sulphate of manganese and magnesium.
664. **Melanterite**, 10c. to \$1.00; monoclinic; hydrous sulphate of iron.
665. **Pisanite**, massive; hydrous sulphate of iron and copper.
666. **Goslarite**, orthorhombic; hydrous sulphate of zinc.
667. **Bieberite**, monoclinic; hydrous sulphate of cobalt.
668. **Morenosite**, massive; hydrous sulphate of nickel.
669. **Chalcanthite**, 5c. to \$2.50; triclinic; hydrous sulphate of copper.
- 669A. **Cupromagnesite**, (Ap. II., p. 14), hydrous sulphate of copper and magnesium.
670. **Cyanochoirite**, monoclinic; hydrous sulphate of potassium and copper.
671. **Alunogen**, 25c. to \$1.50; monoclinic; hydrous sulphate of aluminum.
672. **Coquimbite**, 10c. to \$2.00; hexagonal; hydrous sulphate of iron.
673. **Tschermigite**, isometric; hydrous sulphate of aluminum and ammonium.
674. **Kalinite**, 10c. to \$1.00; isometric; hydrous sulphate of aluminum and potassium [sium]
675. **Voltaite**, isometric; hydrous sulphate of iron.
676. **Blakeite**, isometric; near Coquimbite.
677. **Mendozite**, massive; hydrous sulphate of aluminum and sodium.
678. **Pickeringite**, monoclinic (?); hydrous sulphate of aluminum and magnesium.
679. **Apjohnite**, massive; hydrous sulphate of aluminum and manganese.
680. **Bosjemanite**, monoclinic; hydrous sulphate of aluminum, manganese and [magnesium]
681. **Halotrichite**, massive; hydrous sulphate of aluminum and iron. [magnesium]
682. **Roemerite**, 10c. to \$2.00; monoclinic; hydrous sulphate of iron and zinc.
683. **Copiapite**, 10c. to \$2.00; hexagonal; hydrous sulphate of iron.
684. **Raimondite**, hexagonal; hydrous sulphate of iron.
685. **Fibroferrite**, 25c. to \$2.50; massive; hydrous sulphate of iron.
686. **Apatelite**, massive; hydrous sulphate of iron.
687. **Botryogen**, 25c. to \$2.00; monoclinic; hydrous sulphate of iron.
- 687A. **Bartholomite** (Ap. II., p. 6), massive; hydrous sulphate of iron and sodium.
688. **Aluminite**, 10c. to \$1.00; massive; hydrous sulphate of aluminum.
- 688A. **Ettringite** (Ap. II., p. 19), hexagonal; hydrous sulphate of calcium and aluminum. [potassium]
689. **Alunite**, 10c. to \$1.00; rhombohedral; hydrous sulphate of aluminum and potassium.
690. **Löwigite**, massive; hydrous sulphate of aluminum and potassium.
691. **Jarosite**, 10c. to \$2.50; rhombohedral; hydrous sulphate of iron and potassium. [potassium]
- See page 42.
692. **Carphosiderite**, massive; hydrous sulphate of iron.
693. **Paraluminite**, massive; hydrous sulphate of aluminum.
694. **Pissophanite**, massive; hydrous sulphate of aluminum and iron.
695. **Felsobanyite**, orthorhombic; hydrous sulphate of aluminum.
696. **Glockerite**, massive; hydrous sulphate of iron. [magnesium, etc.]
697. **Lamprophanite**, massive; hydrous sulphate of lead, calcium, manganese,
700. **Linarite**, 25c. to \$3.50; monoclinic; hydrous sulphate of lead and copper.
701. **Brochantite**, 10c. to \$2.50; orthorhombic; hydrous sulphate of copper.
- See page 45.
702. **Langite**, 25c. to \$2.50; orthorhombic; hydrous sulphate of copper.
703. **Cyanotrichite**, Lettsomite; 50c. to \$5.00; massive; hydrous sulphate of copper and aluminum. See page 48.
704. **Woodwardite**, \$1.00 to \$2.50; massive; hydrous sulphate of copper and
705. **Johannite**, monoclinic; hydrous sulphate of uranium and copper. [aluminum]
706. **Uranochalcite**, massive; hydrous sulphate of uranium, copper, and calcium.
707. **Medjidite**, massive; hydrous sulphate of uranium and calcium.
708. **Zippeite**, massive; hydrous sulphate of uranium.
709. **Voglianite**, massive; hydrous sulphate of uranium.
710. **Uraconite**, massive; hydrous sulphate of uranium.
711. **Montanite**, massive; hydrous tellurate of bismuth.
712. **Kerstenite**, massive; selenate of lead.

7. CARBONATES.

I. ANHYDROUS.

715. **Calcite**, 5c. to \$10.00; rhombohedral; carbonate of calcium.
 Var. 1. Iceland Spar, 5c. to \$2.50. 2. Plumbocalcite, 50c. \$3.50. [\$1.00.
 3. Fontainebleau Limestone, 5c. to \$2.00. 4. Argentine, 10c. to
 5. Marble, 5c. to \$2.50. 6. Lumachelle, 50c. to \$2.50. [\$2.50.
 7. Chalk, 5c. to 25c. 8. Oölite, 5c. to 25c. 9. Pisolite, 25c. to
 10. Stalactites and Stalagmites, 5c. to \$2.50.
 11. Travertine, 10c. to \$1.00. 12. Calcareous Tufa, 10c. to 50c.
 13. Agaric Mineral and Rock Meal, 10c. to 50c.
 Our stock of calcite is very large and varied, including the finest
 crystals obtainable, and a very full assortment of the varieties, a
 few of which only are noted above. Blue Calcite, 5c. to 50c.;
 Orange Calcite, 5c. to 50c.; and other varieties are very popular.
 See also page 57.
716. **Dolomite**, 5c. to \$2.50; rhombohedral; carbonate of calcium and magnesium.
717. **Ankerite**, 5c. to \$1.00; rhombohedral; carbonate of calcium, magnesium and
 [iron.
718. **Magnesite**, 5c. to \$1.00; rhombohedral; carbonate of magnesium.
 Var. Breunerite, 10c. to \$1.00.
719. **Mesitite**, 25c. to \$2.50; rhombohedral; carbonate of magnesium and iron.
720. **Pistomesite**, rhombohedral; carbonate of iron and magnesium.
721. **Siderite**, 5c. to \$2.50; rhombohedral; carbonate of iron.
722. **Rhodochrosite**, 5c. to \$5.00; rhombohedral; carbonate of manganese.
723. **Smithsonite**, 5c. to \$2.50; rhombohedral; carbonate of zinc.
724. **Aragonite**, 5c. to \$5.00; orthorhombic; carbonate of calcium.
 Var. 1. Flos Ferri, 10c. to \$5.00.
 2. Mossottite, 25c. to \$2.00. [nesium.
725. **Manganocalcite**, orthorhombic; carbonate of manganese, calcium and mag-
726. **Witherite**, 5c. to \$3.50; orthorhombic; carbonate of barium.
727. **Bromlite**, 25c. to \$2.00; orthorhombic; carbonate of barium and calcium.
728. **Strontianite**, 5c. to \$2.50; orthorhombic; carbonate of strontium.
729. **Cerussite**, 5c. to \$2.50; orthorhombic; carbonate of lead.
730. **Barytocalcite**, 25c. to \$2.00; monoclinic; carbonate of barium and calcium.
731. **Parisite**, hexagonal; fluo-carbonate of cerium, lanthanum, didymium, and
 calcium.
732. **Kischtimite**, massive; hydrous fluo-carbonate of cerium and lanthanum.
- 732A. **Bastnäsit** (Ap. I., p. 2), 25c. to \$2.50; orthorhombic(?); fluo-carbonate of
 cerium and lanthanum.
733. **Phosgenite**, \$2.50 to \$10.00; tetragonal; chloro-carbonate of lead.

II. HYDROUS.

735. **Teschemacherite**, massive; hydrous carbonate of ammonium.
736. **Natron**, monoclinic; hydrous carbonate of sodium.
737. **Thermonatrite**, orthorhombic; hydrous carbonate of sodium.
738. **Trona**, 25c. to \$3.50; monoclinic; hydrous carbonate of sodium. [calcium.
739. **Gay-lussite**, 10c. to \$1.00; monoclinic; hydrous carbonate of sodium and
740. **Hydromagnesite**, 5c. to \$1.00; monoclinic; hydrous carbonate of magnesium.
741. **Hydrodolomite**, massive; hydrous carbonate of calcium and magnesium.
742. **Predazzite**, massive; hydrous carbonate of calcium and magnesium.
743. **Pencatite**, massive; hydrous carbonate of calcium and magnesium.
744. **Hovite**, massive; hydrous carbonate of calcium.
745. **Lanthanite**, orthorhombic; hydrous carbonate of lanthanum.
746. **Tengerite**, 50c. to \$2.50; massive; hydrous carbonate of yttrium.
747. **Zaratite**, 10c. to \$1.00; massive; hydrous carbonate of nickel.
748. **Remingtonite**, massive; hydrous carbonate of cobalt.
749. **Hydrozincite**, 5c. to 50c.; massive; hydrous carbonate of zinc.
750. **Aurichalcite**, 25c. to \$2.50; massive; hydrous carbonate of zinc and copper.
- 750A. **Zinkazurite**, hydrous carbonate of zinc and copper.

751. **Malachite**, 5c. to \$5.00; monoclinic; hydrous carbonate of copper. (See p. 85.)
 752. **Azurite**, 5c. to \$5.00; monoclinic; hydrous carbonate of copper. (See p. 85.)
 752A. **Atlasite**, a carbonate of copper containing chlorine.
 753. **Bismutite**, 10c. to \$1.00; massive; hydrous carbonate of bismuth.
 754. **Liebigite**, massive; hydrous carbonate of uranium and calcium.
 755. **Voglite**, massive; hydrous carbonate of uranium, calcium and copper. [ium.
 755A. **Schröckerite** (Ap. II., p. 50), massive; hydrous oxy-carbonate of uran-

8. OXALATES.

756. **Whewellite**, monoclinic; oxalate of calcium.
 757. **Thierschite**, massive; oxalate of calcium.
 758. **Humboldtine**, massive; hydrous oxalate of iron.

VI. HYDROCARBON COMPOUNDS.

The native hydrocarbons are very imperfectly known. Many of them, instead of being distinct species, are mere mixtures of species, as, for example, Amber, which is a mixture of four or more species. Petroleum, Asphaltum, and the various kinds of mineral resins and wax are similar mixtures. In view of these facts it seems proper to merely enumerate the species numbered as such in Dana's System.

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|---|---|
| 761. Tetrylic Hydride. | 803. Bathvillite. |
| 762. Pentylic Hydride. | 804. Torbanite. |
| 763. Hexylic Hydride. | 805. Xyloretinite. |
| 764. Heptylic Hydride. | 805A. Bombicite (Ap. II., p. 8). |
| 765. Octylic Hydride. | 806. Leucopetrite. |
| 766. Nonylic Hydride. | 807. Eusomite. |
| 767 to 771. Beta-Naptha Group. | 807A. Rosthornite (Ap. I., p. 14.) |
| 772. Scheererite. | 808. Scleretinite. |
| 773. Chrimatite. | 809. Pyrorretinite (Jaulingite). |
| 774. Decatylene. | 810. Reussinite. |
| 775. Endecatylene. | 811. Rochlederite. |
| 776. Dodecatylene. | 812. Schlanite. |
| 777. Decatritylene. | 813. Guyaquillite. |
| 778. Urpethite. | 813A. Beta-Jaulingite. |
| 779. Hatchettite. | 813B. Wheelerite (Ap. II., p. 60.) |
| 780. Ozocerite , 5c. to 50c. | 814. Middletonite. |
| 781. Zietrisikite. | 815. Stanekite. |
| 782. Elaterite. | 816. Anthracoxenite. |
| 783. Settling Stones Resin. | 817. Tasmanite. |
| 784. Fichtelite. | 817A. Trinkerite (Ap. I., p. 16.) |
| 785. Hartite. | 818. Dysodile. |
| 786. Dinite. | 819. Hircite. |
| 787. Ixolyte. | 820. Baikerinite. |
| 788. Benzole. | 821. Butyrellite. |
| 789. Toluole. | 822. Geocerellite. |
| 790. Xylole. | 823. Brücknerellite. |
| 791. Cumole. | 824. Succinellite. |
| 792. Cymole. | 825. Retinellite. |
| 793. Könlite. | 826. Dopplerite. |
| 794. Naphthalin. | 827. Melanellite. |
| 795. Idrialite , 10c. to 50c. | 828. Mellite , 10c. to \$1.00. |
| 795A. Aragotite (Ap. II., p. 4). | 829. Pigotite. |
| 796. Geocerite. | 829A. Organic Salts of Iron. |
| 797. Geomyricite. | 830. Asphaltum , 5c. to 25c. |
| 798. Copalite , 10c. to \$2.00. | 830A. Grahamite. |
| 799. Succinite , 10c. to \$2.00. | 830B. Albertite. |
| 800. Walchowite. | 830C. Pianzite. |
| 801. Bucaramangite. | 830D. Berengelite. |
| 802. Ambrite. | 831. Mineral Coal , 5c. to 25c. |

SPECIES OF UNCERTAIN PLACE IN THE SYSTEM.

832. **Azorite**, tetragonal; columbate of calcium (?).
 833. **Brewsterlinite**, a fluid in the cavities of minerals.
 834. **Cryptolinite**, a fluid in the cavities of minerals.
 835. **Hessenbergite**, monoclinic; an anhydrous silicate.
 836. **Parathorite**, orthorhombic; possibly a variety of thorite.
 837. **Pyrrhite**, isometric; a columbate of zirconium.
 838. **Alurgite**, massive; a purple manganese mineral.

Alphabetical List of New Species and Varieties.

- Abriachanite** (Ap. III., p. 1), massive; near Crocidolite.
Achrematite (Ap. III., p. 1), massive; an uncertain arsenate and molybdate of lead.
Aerinite (Ap. III., p. 2), 25c. to \$1.00; blue heterogeneous mass of silicates.
Aerugite (Ap. II., p. 1), a doubtful arsenate of nickel.
Agnesite (p. 798), massive; carbonate of bismuth.
Agricolite (Ap. II., p. 1), monoclinic; silicate of bismuth.
Aimañfrite (A. J. S., Sept. '84), orthorhombic; hydrous arsenate of manganese, etc.
Aimatolite (A. J. S., Sept. '84), 50c. to \$2.00; hexagonal; hydrous arsenate of manganese, etc. (Diadelphite is identical with Aimatolite.)
Ajkite (Ap. III., p. 3), a resin near amber. [ver and copper.
Alaskaite (Ap. III., p. 3), \$1.00 to \$5.00; massive; sulphide of bismuth, lead, sil-
Allaktite (A. J. S., June, '84), \$1.00 to \$2.50; monoclinic; hydrous arsenate of manganese.
Allophite (Ap. II., p. 2), massive; silicate of aluminum and magnesium.
Amarantite (A. J. S., Aug. '88), 25c. to \$5.00; hydrous sulphate of iron.
Amblystegite (Ap. I., p. 1), orthorhombic; near Hypersthene.
Andrewsite (Ap. I., p. 1), massive; hydrous phosphate of iron and copper.
Animikite (Ap. III., pp. 6 and 71), antimonide of silver.
Annerödite (Ap. III., p. 7), orthorhombic; near Samarskite. [manganese.
Anthochroite (A. J. S., Sept. '89), massive; silicate of magnesium, calcium and
Antillite (Ap. I., p. 1), a hydrated Bronzite; near Serpentine.
Arctolite (Ap. III., p. 9), massive; hydrous silicate of aluminum, calcium, and
Arequipite (Ap. III., p. 9), massive; a silico-antimonate of lead. (?) [magnesium.
Argentobismutite (A. J. S., Mar. '86), sulphide of bismuth and silver.
Argyrodite (A. J. S., Aug. '86), monoclinic; sulphide of silver and germanium.
Argyropyrite (Ap. III., pp. 9 and 115), orthorhombic; sulphide of silver and iron.
Arminite (A. J. S., Aug. '86), hydrous sulphate of copper.
Arsenargentite (Ap. III., p. 9), orthorhombic; arsenide of silver.
Arseniopelite (A. J. S., May '88), rhombohedral (?) ; hydrous arsenate of man-
Arsenstibite (Ap. II., p. 5), hydrous arsenate of antimony. [ganese, etc.
Atelite (Ap. III., pp. 10 and 120), hydrous oxide and chloride of copper.
Atopite (Ap. III., p. 10), isometric; antimonate of calcium, iron, etc.
Auerlite (A. J. S., Dec. '88), tetragonal; hydrous phospho-silicate of thorium.
Avalite (A. J. S., Mar. '86), silicate of chromium and aluminum.
Barcenite (Ap. III., p. 11), massive; an uncertain antimonate.
Barretite (Ap. I., p. 3), massive; silicate, etc., of calcium, magnesium, iron, etc.
Barkevikiite (A. J. S., May, '88), near Arfvedsonite.
Barylite (Ap. III., p. 12), massive; silicate of barium and aluminum.
Barysil (A. J. S., May, '88), hexagonal; silicate of lead.
Beegerite (Ap. III., p. 13), 25c. to \$5.00; isometric; sulphide of lead and bis-
Belonesite (A. J. S., May, '88), tetragonal; molybdate of magnesium. [muth.
Bementite (A. J. S., May, '88), 25c. to \$3.50; massive; hydrous silicate of manga-
 nese. (See page 24.)

- Bertrandite** (*A. J. S.*, May, '84), 25c. to \$10.00; orthorhombic; hydrous silicate of beryllium. (See page 51.) [lithium and sodium. (See p. 18.)]
- Beryllonite** (*A. J. S.*, Jan., '89), 10c. to \$3.50; orthorhombic; phosphate of beryllium.
- Bischofite** (*Ap. III.*, p. 15), probably identical with Chloromagnesite.
- Bismutoferrite** (*Ap. I.*, p. 3, and *Ap. II.*, p. 7), silicate of iron and bismuth.
- Bismutosphærite** (*Ap. III.*, p. 15), massive; carbonate of bismuth.
- Blomstrandite** (*Ap. III.*, p. 16), massive; hydrous titano-tantalo-columbate of uranium, iron, calcium, etc.
- Bolivite** (*Ap. III.*, p. 16), oxy-sulphide of bismuth.
- Brackebuschite** (*Ap. III.*, pp. 18 and 36), a variety of Descloizite.
- Brandite** (*A. J. S.*, March, '90, p. 212), hydrous arsenate of calcium and manganese.
- Bravaisite** (*Ap. III.*, p. 18), orthorhombic; near Glauconite.
- Broggerite** (*A. J. S.*, June, '84), uranate of thorium, yttrium, lead and cerium.
- Buckingite** (*A. J. S.*, Aug., '88), triclinic; hydrous sulphate of iron.
- Bustamentite** (*Ap. II.*, p. 9), an iodide of lead.
- Cacoclasite** (*Proc. Min. Sec. A. N. S.*, Phila., Nov. 26, 1883), 10c. to 50c.; "a mixture of quartz, calcite, apatite and other unknown minerals." *Genth. A. J. S.*, Sept. '89.
- Calciorthorite** (*A. J. S.*, May, '88), hydrous silicate of thorium and calcium.
- Calcozincite** (*Ap. III.*, p. 20), 10c. to 50c.; a mixture of zincite and calcite.
- Cappelenite** (*A. J. S.*, Mar., '86), hexagonal; boro-silicate of yttrium, &c.
- Caracolate** (*A. J. S.*, May, '87), orthorhombic; hydrous chloro-sulphate of lead and sodium.
- Caryinite** (*Ap. III.*, p. 20), massive; arsenate of lead, manganese, &c. [magnesium.
- Caryopillite** (*A. J. S.*, June, '89), massive; hydrous silicate of manganese and
- Catlinite**, Indian Pipe Stone; (p. 796), 10c. to 50c.; a rock, not a mineral species.
- Celestialite** (*Ap. III.*, p. 21), a meteoric sulpho-hydrocarbon.
- Chalcocomenite** (*Ap. III.*, p. 23), monoclinic; hydrous selenite of copper.
- Chalcophanite** (*Ap. III.*, p. 23), 5c. to \$1.00; rhombohedral; hydrous oxide of manganese and zinc. [iron, copper and aluminum.
- Chalcosiderite** (*Ap. III.*, p. 24), 25c. to \$2.00; triclinic; hydrous phosphate of
- Chalypite** (*Ap. II.*, p. 11), a meteoric carbide of iron.
- Chloralluminite** (*Ap. III.*, p. 25), hydrous chloride of aluminum.
- Chlorocalcite** (*Ap. II.*, p. 11), isometric; chloride of calcium.
- Chloromagnesite** (*Ap. III.*, p. 25), massive; hydrous chloride of magnesium.
- Chlorothionite** (*Ap. III.*, p. 25), massive; sulphate of potassium, and chloride of
- Chlorotile** (*Ap. III.*, p. 25), orthorhombic; hydrous arsenate of copper. [copper.
- Clarite** (*Ap. II.*, p. 12), monoclinic (?); sulph-arsenide of copper.
- Cleveite** (*Ap. III.*, p. 27), 50c. to \$2.50; isometric; hydrous oxide of uranium, lead, yttrium, &c.
- Cliftonite** (*A. J. S.*, Sep., '87), a cubical form of graphitic carbon.
- Clinocrocite** (*Ap. III.*, p. 28), monoclinic (?); hydrous sulphate of aluminum, iron, sodium and potassium. [iron, aluminum and sodium.
- Clinophasite** (*Ap. III.*, p. 28), monoclinic (?); hydrous sulphate of potassium,
- Cobaltomenite** (*A. J. S.*, July, '82), monoclinic; selenite of cobalt.
- Cohenite** (*A. J. S.*, Jan., '90), isometric (?); carbide of iron, nickel and cobalt.
- Colemanite** (*A. J. S.*, June, '84, et. al.), 10c. to \$5.00; monoclinic; hydrous borate of calcium.
- Coloradoite** (*Ap. III.*, p. 29), 25c. to \$2.50; massive; telluride of mercury.
- Coronguite** (*Ap. III.*, p. 30), massive; antimonate of lead and silver.
- Cossyrite** (*Ap. III.*, p. 31), triclinic; near Amphibole.
- Cristobalite** (*A. J. S.*, July, '87), binoxide of silicon in octahedral twins.
- Crypholite** (*A. J. S.*, May, '88), monoclinic; near Wagnerite.
- Cryptohalite** (*Ap. III.*, p. 32), fluo-silicate of ammonium.
- Cuprocalsite** (*Ap. III.*, p. 32), massive; hydrous carbonate of copper and calcium.
- Cuspidine** (*Ap. III.*, p. 33), monoclinic; fluo-silicate of calcium.
- Cyprusite** (*Ap. III.*, p. 33), a doubtful iron sulphate.
- Dahlite** (*A. J. S.*, Jan., '89), hydrous carbonophosphate of calcium.
- Danbræelite** (*Ap. III.*, p. 34), massive, meteoric sulphide of chromium and iron.
- Danbreite** (*Ap. III.*, p. 35), massive; oxy-chloride of bismuth.
- Daviesite** (*A. J. S.*, Sept., '89), oxy-chloride of lead. [and magnesium.
- Davreuxite** (*Ap. III.*, p. 35), orthorhombic; hydrous silicate of aluminum, manganese

- Dawsonite** (Ap. II., p. 16), monoclinic; hydrous carbonate of aluminum and sodium.
- De Saulesite** (*A. J. S.*, Oct., '89), massive; hydrous silicate of nickel and zinc.
- Destinezite** (Ap. III., p. 36), massive; an iron phosphate.
- Diabantite** (Ap. III., p. 37), massive; hydrous silicate aluminum, iron, magnesium, etc.
- Diadelphite**, see *Aimatolite*. [calcium and sodium.]
- Dickinsonite** (Ap. III., p. 37), monoclinic; hydrous phosphate of iron, manganese, Dietrichite (Ap. III., p. 39), monoclinic (?); hydrous sulphate of aluminum, zinc, iron, etc.
- Dihydrothenardite** (*A. J. S.*, May, '88), monoclinic; hydrous sulphate of sodium.
- Dudgeonite** (*A. J. S.*, Sept., '89), massive; hydrous arsenate of nickel and calcium.
- Dumortierite** (Ap. III., p. 39), 10c. to \$2.00; orthorhombic; silicate of aluminum.
- Dumreicherite** (*A. J. S.*, May, '88), monoclinic (?); hydrous sulphate of magnesium and aluminum. [nesium.]
- Duporthite** (Ap. III., p. 39), massive; hydrous silicate of aluminum, iron and mag-
- Dürfeldtite** (Ap. III., p. 40), massive; sulph-antimonide of lead, silver, mangan-
ese, etc.
- Duxite** (Ap. III., p. 40), a resin. [iron, cerium and sodium.]
- Dysanalyte** (Ap. III., p. 40), 25c. to \$1.50; isometric; columbo-tantalate of calcium.
- Edisonite** (*A. J. S.*, Oct., '88), orthorhombic; oxide of titanium.
- Eggonite** (Ap. III., p. 40), triclinic; silicate of cadmium.
- Eichwaldite** (*A. J. S.*, Dec., '83); borate of aluminum and iron.
- Ekdemite** (Ap. III., p. 41), tetragonal (?); chloro-arsenate of lead. [potassium.]
- Elpasolite** (Sm. Rept., '85, Part I., p. 697), isometric; fluoride of aluminum, sodium and
- Elroquite** (Ap. III., p. 41), massive; hydrous silicate of aluminum and iron.
- Emmonsite** (*A. J. S.*, June, '86), monoclinic (?); tellurite of iron.
- Empholite** (*A. J. S.*, Aug., '83), orthorhombic; hydrous silicate of aluminum, etc.
- Endlichite** (*A. J. S.*, July, '85), 25c. to \$2.50; hexagonal; a vanadium mimetite.
- Enysite** (Ap. III., p. 42), massive; hydrous sulphate of aluminum and copper.
- Epigenite** (*A. J. S.*, Feb., '90), hydrous silicate of manganese and magnesium.
- Eriochalcite** (Ap. III., p. 43), copper chloride.
- Eucrasite** (Ap. III., p. 43), closely related to thorite.
- Eucryptite** (Ap. III., p. 44), hexagonal; silicate of aluminum and lithium.
- Facellite** (*A. J. S.*, June, '89), hexagonal (?); silicate of aluminum and potassium. (Kaliophilite).
- Fairfieldite** (Ap. III., p. 45), \$1.00 to \$3.50; triclinic; hydrous phosphate of calcium, manganese and iron. [and sodium.]
- Ferronatrite** (*A. J. S.*, Sept., '89), 50c. to \$5.00; massive; hydrous sulphate of iron
- Ferrostibian** (*A. J. S.*, Feb., '90), monoclinic; hydrous antimonate of manganese
- Ferrotellurite** (Ap. III., p. 46), tellurate of iron. [and iron.]
- Fiedlerite** (*A. J. S.*, May, '86), monoclinic; hydrous chloride of lead.
- Fillowite** (Ap. III., p. 47), monoclinic; hydrous phosphate of manganese, iron, calcium and sodium.
- Flinkite** (*A. J. S.*, Sept., '89), orthorhombic; hydrous arsenate of manganese.
- Franklandite** (Ap. III., p. 48), massive; hydrous borate of sodium and calcium.
- Freyalite** (Ap. III., p. 48), hydrous silicate of cerium, thorium, etc.
- Friedelite** (Ap. III., p. 48), rhombohedral; hydrous silicate of manganese.
- Frieseite** (Ap. III., p. 116), orthorhombic; sulphide of silver and iron. [lead.]
- Galenobismutite** (Ap. III., p. 49), 50c. to \$2.50; massive; sulphide of bismuth and
- Ganomalite** (Ap. III., p. 49), massive; silicate of lead, manganese, calcium and magnesium.
- Gastaldite** (Ap. III., pp. 50 and 52), monoclinic; silicate, near glaucophane.
- Gedanite** (Ap. III., p. 51), a resin.
- Gerhardtite** (*A. J. S.*, July, '85), orthorhombic; hydrous nitrate of copper.
- Ginilsite** (Ap. III., p. 51), massive; hydrous silicate of calcium, iron, aluminum and magnesium.
- Goyazite** (*A. J. S.*, Sept., '84), hydrous phosphate of aluminum and calcium.
- Guanajuatite** (Ap. III., p. 53), orthorhombic; sulpho-selenide of bismuth.
- Guanapite** (Ap. I., p. 6, and Ap. III., p. 88), hydrous sulphate and oxalate of ammonium and potassium.
- Guejarite** (Ap. III., p. 54), orthorhombic; sulpho-antimonide of copper.
- Guitermanite** (*A. J. S.*, April, '85), 25c. to \$2.50; sulph-arsenide of lead.

- Hanksite** (*A. J. S.*, Aug. '85), 25c. to \$10.00; hexagonal; sulphato-carbonate of sodium. [nium.
- Hannayite** (*Ap. III.*, p. 55), triclinic; hydrous phosphate of magnesium and ammonium. [etc.
- Harstigit** (*A. J. S.*, May, '87), orthorhombic; hydrous silicate of calcium, aluminum, manganese, etc. [etc.
- Hatchettolite** (*Ap. III.*, p. 56), isometric; columbo-tantalate of uranium, calcium, heliophyllite (*A. J. S.*, June '89), orthorhombic; chloro-arsenate of lead.
- Henwoodite** (*Ap. III.*, p. 57), massive; hydrous phosphate of aluminum and copper.
- Herrngrundite** (*Ap. III.*, p. 57), monoclinic; hydrous sulphate of copper.
- Hetærolite** (*Ap. III.*, p. 58), 10c. to \$1.00; massive; oxide of zinc and manganese.
- Heubachite** (*Ap. III.*, p. 58), massive; hydrous oxide of cobalt, nickel, iron, and hieratite (*A. J. S.*, July '82), isometric; fluo-silicate of potassium. [manganese.
- Hofmannite** (*Ap. III.*, p. 59), a hydro-carbon.
- Hohmannite** (*A. J. S.*, Aug. '88), \$1.00 to \$5.00; hydrous sulphate of iron.
- Homilite** (*Ap. III.*, p. 59), 50c. to \$3.50; monoclinic; boro-silicate of calcium and horsfordite (*A. J. S.*, Aug. '88), massive; antimonide of copper. [iron.
- Huminite** (*Ap. III.*, p. 60), a hydro-carbon.
- Huntillite** (*Ap. III.*, pp. 60 and 71), \$1.00 to \$3.50; massive; arsenide of silver.
- Hyalotekite** (*Ap. III.*, p. 60), massive; silicate of lead, barium, and calcium.
- Hydrargyrite** (*Ap. II.*, p. 8), oxide of mercury.
- Hydrocerussite** (*Ap. III.*, p. 61), hydrous carbonate of lead.
- Hydrocuprite** (*Ap. II.*, p. 28), 50c. to \$2.50; massive; hydrous oxide of copper.
- Hydrofluorite** (*Ap. III.*, p. 61), hydrofluoric acid gas.
- Hydrofranklinite** (*Ap. III.*, p. 61), hydrous oxide of zinc, manganese, and iron.
- Hydrogiobertite** (*A. J. S.*, June '86), hydrous carbonate of magnesium.
- Hydrohalite** (*Ap. II.*, p. 29), a hydrous chloride of sodium. [aluminum and sodium.
- Hydronephelite** (*A. J. S.*, Apr '86), 10c. to \$1.00; massive; hydrous silicate of hydroplumbite (*A. J. S.*, Sept. '89), hydrous oxide of lead. [nesium, and calcium.
- Hydrorhodonite** (*Ap. III.*, p. 61), massive; hydrous silicate of manganese, mag-thlëite (*Ap. III.*, p. 62), massive; hydrous sulphate of iron.
- Ilesite** (*Ap. III.*, p. 62), massive; hydrous sulphate of manganese, zinc, and iron.
- Inesite** (*A. J. S.*, June '89), 50c. to \$2.00; triclinic; hydrous silicate of manganese and calcium.
- Iodobromite** (*Ap. III.*, p. 63), isometric; bromo-chloride and iodide of silver.
- Ionite** (*Ap. III.*, p. 63), a fossil hydrocarbon.
- Jeromeffite** (*A. J. S.*, June, '83), hexagonal; borate of aluminum and iron.
- Kainosite** (*A. J. S.*, June, '86), orthorhombic or monoclinic; hydrous silico-carbonate of yttrium, erbium and calcium.
- Kaliophilite** (*A. J. S.*, May, '87), silicate of aluminum and potassium.
- Kentrolite** (*Ap. III.*, p. 65), orthorhombic; silicate of manganese and lead.
- Knoxvillite** (*A. J. S.*, Jan., '90) hydrous sulphate of chromium.
- Koninckite** (*A. J. S.*, Apr. '85), massive; hydrous phosphate of iron.
- Krennerite** (*Ap. III.*, p. 66), orthorhombic; telluride of gold, silver and copper.
- Krönnkite** (*Ap. III.*, p. 66), triclinic (?); hydrous sulphate of copper and sodium.
- Langbanite** (*A. J. S.*, July, '87), hexagonal; silicate of manganese with antimonate of iron.
- Lansfordite** (*A. J. S.*, Aug., '88), 50c. to \$2.50; hydrous carbonate of magnesium.
- Laubanite** (*A. J. S.*, May, '88), massive; hydrous silicate of aluminum and calcium.
- Launionite** (*A. J. S.*, May, '88), orthorhombic; hydrous chloride of lead.
- Lautite** (*Ap. III.*, p. 67), orthorhombic; sulph-arsenide of copper.
- Lavenite** (*A. J. S.*, Mar., '86), monoclinic; silicate of zirconium, calcium, sodium, etc.
- Lawrencite** (*Ap. III.*, p. 67), protochloride of iron.
- Leidyite** (*Ap. III.*, p. 68), 10c. to \$1.00; massive; hydrous silicate of aluminum, iron, magnesium and calcium.
- Lepidophaeite** (*Ap. III.*, p. 130), massive; hydrous oxide of manganese and copper.
- Leucochalcite** (*Ap. III.*, p. 69), massive; hydrous arsenate of copper.
- Leucotile** (*Ap. III.*, p. 69), orthorhombic (?); hydrous silicate of magnesium, calcium, aluminum and iron.
- Liskeardite** (*Ap. III.*, p. 70), 50c. to \$2.00; massive; hydrous arsenate of aluminum.
- Ludlamite** (*Ap. III.*, p. 70), 50c. to \$2.50; monoclinic; hydrous phosphate of iron.
- Magnolite** (*Ap. III.*, p. 72), tellurate of mercury (?).
- Mallardite** (*Ap. III.*, p. 72), monoclinic; hydrous sulphate of manganese.

- Manganosite** (Ap. III., p. 73), isometric; protoxide of manganese. [ganese, etc.
Manganoshibite (A. J. S., Sept., '84), orthorhombic (?); arseno-antimonate of man-
Marmairolite (Ap. III., p. 74), monoclinic (?); silicate of magnesium, calcium,
Martinite (A. J. S., May, '88), hydrous phosphate of calcium. [sodium, potassium, etc.
Matricite (Ap. III., p. 74), massive; hydrous silicate of magnesium. [calcium.
Mazapillite (A. J. S., Nov., '88, et al), orthorhombic; hydrous arsenate of iron and
Melanocerite (A. J. S., May, '83), hexagonal; silicate of calcium, cerium, etc.
Melanophlogite (Ap. III., p. 74), cubical binoxide of silicon.
Melanosiderite (Ap. III., p. 75), massive; hydrous silicate of iron.
Melanotekite (Ap. III., p. 75), massive; silicate of lead and iron.
Melanothallite (Ap. III., p. 75), chloride of copper.
Messelite (A. J. S., Jan. '90), triclinic; hydrous phosphate of calcium and iron.
Metastibnite (A. J. S., June '89), red sesquisulphide of antimony.
Michel-Lévyite (A. J. S., Sept. '89), monoclinic varite (see also A. J. S., Jan. '90.)
Microcline (Ap. III., p. 80), 5c. to \$5.00; triclinic; silicate of aluminum and
 Var. I., Amazonstone, 5c. to \$5.00; 2. Chesterlite, 10c. to \$2.00. [potassium.
 3. Perthite, 25c. to \$1.00.
Milarite (Ap. I., p. 10; II., p. 39; III., p. 81), 50c. to \$2.50; orthorhombic; hydrous
 silicate of aluminum, calcium and potassium.
Miriquidite (Ap. II., p. 40), hexagonal; phospho-arsenate of lead and iron(?).
Mixite (Ap. III., p. 82), 25c. to \$4.00; monoclinic(?) or triclinic(?); hydrous arse-
 nate of copper and bismuth.
Molybdomenite (A. J. S., July '82), orthorhombic; selenite of lead.
Monetite (A. J. S., May '82), hydrous phosphate of calcium.
Monite (A. J. S., May '82), hydrous phosphate of calcium. [sodium and potassium.
Monzonite (Ap. I., p. 11), massive; silicate of aluminum, calcium, magnesium, iron,
Mottramite (Ap. III., p. 83), massive; hydrous vanadate of lead and copper.
Napalite (A. J. S., Jan. '90), a hydrocarbon.
Neocyanite (Ap. III., p. 84), monoclinic; anhydrous silicate of copper.
Nesquehonite (A. J. S., Feb. '90), 50c. to \$2.50; orthorhombic; hydrous carbonate
Neudorfite (Ap. III., p. 84), a hydrocarbon. [of magnesium.
Newberyite (Ap. III., p. 84), orthorhombic; hydrous phosphate of magnesium.
Niccochromite (Ap. III., p. 85), massive; "dichromate of lead" (?)
Nitrobarite (Ap. III., p. 85), isometric; nitrate of barium.
Nitroglauberite (Ap. II., p. 41), hydrous nitrate and sulphate of sodium.
Nivenite (A. J. S., Dec. '89), \$1.00 to \$5.00; isometric (?); hydrous uranate of tho-
 rium, yttrium and lead. [nesium.
Nocerite (Ap. III., p. 85), 25c. to \$2.00; hexagonal; fluoride of calcium and mag-
Nordenskiöldite (A. J. S. May '88), rhombohedral; borate of calcium and tin.
Ochrolite (A. J. S., June '89), orthorhombic; chloro-antimonate of lead.
Orileyte (Ap. I., p. 12), massive; arsenide of copper and iron(?).
Osbornite (Ap. I., p. 12), meteoric oxysulphide of titanium and calcium(?).
Oxammitte (Ap. III., p. 88), probably identical with Guanapite.
Paposite (A. J. S. June '89), hydrous sulphate of iron.
Peckhamite (Ap. III., p. 89), meteoric silicate of magnesium and iron.
Penwithite (Ap. III., p. 90), massive; hydrous silicate of manganese.
Phillipite (Ap. III., p. 92), massive; hydrous sulphate of copper and iron.
Phosphochromite (Ap. I., p. 9 and III., p. 92), massive; phospho-chromate of lead
 and copper.
Phosphuranylite (Ap. III., p. 92), massive; hydrous phosphate of uranium.
Picite (Ap. III., p. 93), massive; hydrous phosphate of iron. [and aluminum.
Picroallumogene (Ap. III., p. 93), 25c. to \$2.50; hydrous sulphate of magnesium
Picroepidote (A. J. S., June, '83), monoclinic; silicate of aluminum and magnesium.
Pilinite (Ap. III., p. 93), orthorhombic; hydrous silicate of aluminum, calcium and
 lithium.
Pilolite (Ap. III., p. 94), massive; hydrous silicate of magnesium and aluminum.
Pinnoite (A. J. S., Mar., '86), tetragonal; hydrous borate of magnesium.
Plagiocitrite (Ap. III., p. 95), monoclinic or triclinic; hydrous sulphate of aluminum,
 iron, sodium and potassium.
Pleonectite (A. J. S., Sept., '89), massive; chloro-antimonio-arsenate of lead.
Pleurasite (A. J. S., Feb., '90), chloro-arsenate of iron and manganese.
Plumbomanganite (Ap. III., p. 95), massive; sulphide of manganese and lead.

- Plumbonacrite** (*A. J. S.*, Sept., '89), hydrous carbonate of lead.
- Plumbostannite** (Ap. III., p. 96), massive; sulph-antimonide of lead, tin and iron.
- Polyarsenite** (*A. J. S.*, Mar., '86), arsenate of manganese.
- Polydymite** (Ap. III., p. 96), isometric; sulphide of nickel.
- Posepyte** (Ap. III., p. 96), a hydrocarbon.
- Proidonite** (Ap. III., p. 97), fluoride of silicon.
- Pseudobrookite** (Ap. III., p. 97), 50c. to \$1.50; orthorhombic; titanate of iron.
- Pseudocotunnite** (Ap. III., p. 97), chloride of lead and potassium. [calcium, etc.]
- Pseudonatrolite** (Ap. III., p. 98), orthorhombic (?); hydrous silicate of aluminum.
- Psittacinite** (Ap. III., p. 98), massive; hydrous vanadate of lead and copper.
- Ptilolite** (*A. J. S.*, Aug., '86), hydrous silicate of aluminum, calcium, potassium and sodium.
- Pyrophosphorite** (Ap. III., p. 100), massive; phosphate of calcium and magnesium.
- Quenstedtite** (*A. J. S.*, Aug., '88), monoclinic; hydrous sulphate of iron.
- Randite** (Ap. III., p. 102), 25c. to \$1.50; hydrous carbonate of calcium and uranium.
- Raphisiderite** (*A. J. S.*, Jan., '90), sesquioxide of iron.
- Roddigite** (Ap. III., p. 102), orthorhombic; hydrous phosphate of manganese.
- Redingtonite** (*A. J. S.*, Jan., '90), triclinic (?); hydrous sulphate of chromium.
- Redondite** (Ap. I., p. 18), massive; hydrous phosphate of aluminum and iron.
- Reinite** (Ap. III., p. 102), tetragonal; tungstate of iron.
- Retzbanyite** (*A. J. S.*, Dec., '82), sulphide of bismuth and lead.
- Rhabdite** (Ap. III., p. 103), meteoric phosphide of iron, with sulphur and arsenic.
- Rhabdophane** (Ap. III., p. 103), hydrous phosphate of yttrium, erbium, lanthanum and didymium.
- Rhodotilite** (*A. J. S.*, June, '89), triclinic; hydrous silicate of manganese and calcium.
- Richellite** (*A. J. S.*, Nov., '83), massive; hydrous fluo-phosphate of iron.
- Riebeckite** (*A. J. S.*, Nov., '88), silicate of iron and sodium.
- Rinkite** (*A. J. S.*, Jan., '85), monoclinic; titano-silicate of calcium, cerium, etc., with fluoride of sodium. [Samarskite.]
- Rogersite** (Ap. III., p. 104), 25c. to \$1.00; massive; decomposition product of Roscoelite.
- Roscoelite** (Ap. III., p. 104), \$1.00 to \$5.00; massive; hydrous silicate of vanadium, aluminum, potassium, etc. [ium, etc.]
- Rosenbuschite** (*A. J. S.*, May, '88), monoclinic; silicate of calcium, sodium, zircon.
- Sarkinite** (*A. J. S.*, Mar., '86), arsenate of manganese.
- Schneebergite** (Ap. III., p. 107), isometric; antimonate of calcium, etc.
- Schraunite** (Ap. III., p. 107), a hydrocarbon.
- Semseyite** (Ap. III., p. 108), sulph-antimonide of lead.
- Serpierite** (Ap. III., p. 109), orthorhombic; hydrous basic sulphate of copper and Siderazot.
- Siderazot** (Ap. III., p. 109), massive; nitride of iron. [zinc.]
- Sideronatrite** (Ap. III., p. 109), massive; hydrous sulphate of iron and sodium.
- Siegburgite** (Ap. II., p. 51), 25c. to \$1.00; a hydrocarbon.
- Silfbergite** (*A. J. S.*, Aug. '83), silicate of iron, manganese, magnesium, and calcium.
- Sipyllite** (Ap. III., p. 110), tetragonal; columbate of erbium, lanthanum, didymium, etc. [inum.]
- Sonomaite** (Ap. III., p. 98), massive; hydrous sulphate of magnesium and aluminum.
- Spangolite** (*A. J. S.*, May '90), hexagonal; hydrous chloro-sulphate of copper and aluminum. (See page .) [(See p.—)]
- Sperrylite** (*A. J. S.*, Jan., '89), \$1.00 to \$10.00; isometric; arsenide of platinum.
- Sphaerocobaltite** (Ap. III., p. 110), hexagonal; carbonate of cobalt.
- Spodiosite** (Ap. III., p. 112), orthorhombic; fluo-phosphate of calcium.
- Steenstrupine** (*A. J. S.*, Feb. '83), hexagonal; hydrous silicate of lanthanum, didymium, cerium, thorium, etc. [iron.]
- Strengite** (Ap. III., p. 116), \$1.00 to \$3.50; orthorhombic; hydrous phosphate of Stützite.
- Stützite** (Ap. III., p. 117), monoclinic; telluride of silver.
- Stuvenite** (*A. J. S.*, Jan. '87), hydrous sulphate of aluminum, sodium and magnesium.
- Sulphohalite** (*A. J. S.*, Dec. '88), isometric; sulphato-chloride of sodium.
- Synadelphite** (Sm. Rept. '84, p. 557), monoclinic; hydrous arsenate of manganese, aluminum and iron.
- Szaboite** (Ap. III., p. 118), 50c. to \$1.50; triclinic; silicate of iron and calcium.
- Symkrite** (Ap. III., p. 118), massive; hydrous sulphate of manganese.
- Talcosite** (Ap. I., p. 15), hydrous silicate of aluminum.
- Tapalpite** (Ap. I., p. 15, II, p. 55), massive; sulph-telluride of bismuth and silver.

- Tarapacaité** (Ap. III., p. 119), chromate of potassium.
- Tellurate** of copper and lead (Ap. III., p. 55). [uranium.
- Thorogummite** (*A. J. S.*, Dec. '89), 50c. to \$5.00; hydrous silicate of thorium and
- Thrombolite** (Ap. III., p. 123), massive; hydrous oxide of copper and antimony (?)
- Tobermorite** (Ap. III., p. 123), massive; hydrous silicate of calcium.
- Tocornalite** (Ap. II., p. 56), massive; iodide of silver and mercury.
- Triplodite** (Ap. III., p. 125), monoclinic; hydrous phosphate of manganese and iron.
- Trippkeite** (Ap. III., p. 125), tetragonal; arsenite of copper.
- Tritochorite** (Ap. III., p. 125 and 44), massive; vanadate of lead, zinc and copper.
- Tysonite** (Ap. III., p. 126), \$1.00 to \$5.00; hexagonal; fluoride of cerium, lanthanum and didymium.
- Uintahite** (*A. J. S.*, Mar. '86), 10c. to \$1.00; a hydrocarbon.
- Uranocircite** (Ap. III., p. 127), \$1.00 to \$2.50; orthorhombic; hydrous phosphate of uranium and calcium.
- Uranopilite** (*A. J. S.*, Dec. '82), hydrous silicate of uranium and calcium.
- Uranothallite** (*A. J. S.*, July '82), orthorhombic; hydrous carbonate of calcium and uranium.
- Uranothorite** (Ap. III., p. 127 and 122), massive; hydrous silicate of thorium, uranium, etc. [and calcium.
- Uranotil** (Ap. I., p. 16), 25c. to \$2.50; orthorhombic; hydrous silicate of uranium
- Urusite** (Ap. III., p. 128 and 109), orthorhombic; hydrous sulphate of iron and sodium.
- Utahite** (*A. J. S.*, Sept. '84), 25c. to \$2.00; hexagonal; hydrous sulphate of iron.
- Vesbine** (Ap. III., p. 129), vanadate of aluminum(?).
- Warrenite** (*A. J. S.*, Jan. '90 and Dec. '88), massive; sulph-antimonite of lead and iron. [calcium, sodium, potassium, etc.
- Wattevillite** (Ap. III., p. 131), orthorhombic or monoclinic; hydrous sulphate of
- Webskyite** (*A. J. S.*, July '87), hydrous silicate of magnesium, aluminum and iron.
- Werthemanite** (Ap. III., p. 131), massive; hydrous sulphate of aluminum.
- Wurtzilite** (*A. J. S.*, Feb. '90), a hydrocarbon.
- Xanthiosite** (Ap. II., p. 62), arsenate of nickel.
- Xanthoarsenite** (Sm. Rept., '84, p. 557), hydrous arsenate of manganese, &c.
- Yttrialite** (*A. J. S.*, Dec. '89), 25c. to \$5.00; massive; silicate of yttrium and thorium.
- Zincaluminite** (Ap. III., p. 133), hexagonal (?); hydrous sulphate of zinc and aluminum. [&c.
- Zunyite** (*A. J. S.*, Apr. '85), 10c. to \$1.50; isometric; hydrous silicate of aluminum,

Index.

THIS INDEX contains the names of all described mineral species, and a very large number of important synonyms and varieties. The number attached is the species number in Dana's System of Mineralogy, except in the case of the new minerals whose exact place in the System has not yet been designated. The *pages in this catalogue* on which such minerals are described are given in these instances, and by reference to them, the crystallographic form and chemical composition may be ascertained, and the places in which they are more fully described are also given. Abbreviations are as follows: p.=page in this catalogue; s.=synonym; v.=variety; n.=near.

AARITE . . . s 72A	Algerite . . . v 299	Ambrosine . . . 799B	Antimonial Cop-
Abriachanite p 83	Algodonite . . . 38	Amesite . . . v 457	per glance s 119
Acadialite . . . v 386	Alipite . . . 347	Amethyst . . . v 231	Lead ore . . . s 119
Acanthite . . . 60	Alisonite . . . v 100	oriental . . . v 179	Nickel . . . s 72
Achirite . . . s 345	Allagite . . . n 241	Amianthus . . . v 247	Ochre . . . s 227 &c.
Achmatite . . . v 276	Allaktite . . . p 83	" . . . v 411	Red Silver . s 117
Achrematite . . . p 83	Allanite . . . 278	Ammiolite . . . 507	Silver . . . s 35
Achroite . . . v 320	Allemontite . . . 19	Ammonia alum s 673	Antimonite . . . s 29
Achteragdit . n 420	Allochromite . v 271	Amoibite . . . v 86	Antimony . . . 18
Acmite . . . 240	Alloclasite . . . 97	Amphibole . . . 247	arsenical . . . s 19
Actinolite . . . v 247	Allogonite . . . s 504	Amphigene . . . s 309	blende . . . s 226
Adamantine	Allomorphite . v 630	Amphilogite . v 293	glance . . . s 29
Spar . . . s 179	Allopalladium . 6	Amphithalite . 574	gray . s 29 and 90
Adamite . . . 537	Allophane . . . 374	Amphodelite . v 310	ochre . s 227 &c.
Adamsite . . . v 293	Allophite . . . p 83	Analcite . . . 383	plumose . . . s 112
Adelpholite . . 484	Alluaudite . . n 498	Anatase . . . s 194	red . . . s 226
Adinole . . . v 315	Almandine . . v 271	Anauxite . . . 404C	sulphide . . s 29
Adularia . . . v 316	Almandite . . v 271	Andalusite . . 3·2	white . . . s 221
Aedelforsite s 237A	Alshedite . . . v 329	Andesite . . . 312	Antozonite . . v 159
" . . . v 343	Alstonite . . . s 727	Andradite . . v 271	Antrimolite . v 381
Aedelite . . . v 363	Altaite . . . 48	Andreolite . . s 390	Apatelite . . . 686
Aegirite . . . 239	Alum, ammonia s 673	Andrewsite . p 83	Apatite . . . 492
Aenigmatite n 276A	feather . s 681	Anglarite . . . v 524	Aphanesite . . s 547
Aerinite . . . p 83	iron . s 681	Anglesite . . . 633	Aphanyte . . . v 247
Aerugite . . . p 83	magnesia s 678	Anhydrite . . 632	Aphrite . v 320, 715
Aeschynite . . 480	manganese	Animikite . . p 83	Aphrizite v 320, 715
Aftonite . . . n 125	" . . . s 679	Ankerite . . . 717	Aphrodite . . . 403
Agalmatolite . v 422	potash . s 674	Annabergite . 527	Aphroselenon v 654
Agaric Mineral v 715	soda . . . s 677	Annerödite . p 83	Aphrosiderite . 454
Agate . . . v 231	Alumian . . . 647	Annite . . . 291	Aphthitalite . 627
Aglaite . . . s 401	Alumina . . . s 179	Annivite . . . v 125	Aphthonite . n 125
Agnesite . . . p 83	Aluminite . . . 688	Anomite . . . v 289	Apjohnite . . . 679
Agricolite . . p 83	Alumocalcite . v 232	Anorthite . . . 810	Aplome . . . v 271
Agustite . . . v 492	Alum-stone . s 689	Anthochroite . p 83	Apophyllite . 370
Aikinite . . . 124	Alunite . . . 689	Antholite . . . v 247	Apyrite . . . v 320
Aimaifibrite . . p 83	Alunogen . . . 671	Anthophyllite . 246	Aquacreptite . 415B
Aimatolite . . p 83	Alurgite . . . 838	hydrous . v 247	Aquamarine . v 254
Ainalite . . . 192A	Alvite . . . 470	Anthosiderite . 360	Araeocone . . . s 619
Ajkite . . . p 83	Amalgam . . . 9	Anthracite . v 831	Aragonite . . . 724
Akontite . . . v 94	gold . . . 11	Anthraconite . v 715	Aragotite . . . 795A
Alabandite . . . 52	Amarantite . . p 83	Anthracoxenite . 816	Arcanite . . . s 627
Alabaster . . . v 654	Amausite . . . v 315	Antiedrite . . s 371	Arctolite . . . p 83
Alalite . . . v 238	Amazon Stone	Antigorite . . v 411	Ardennite . . . 284A
Alaskaite . . . p 83	Microcline p 87	Antillite . . . p 83	Arendalite . . v 276
Albertite . . . 830B	Amber . . . s 799	Antimonial Ar-	Arequipite . . p 83
Albin . . . v 370	Amblygonite . 503	senic . . . v 17	Arfvedsonite . 248
Albite 315	Amblystegite . p 83	Antimonial cop-	Argentine . . . v 715
Alexandrite . v 191	Ambrite . . . 802	per s 101	Argentite . . . 40

Argentobismu- tite p 88	Aventurine Feld- spar v 814, 816	Beyrichite . . . 66A	Branchite . . . v 786
Argentopyrite 40A	Quartz . . . v 231	Bieberite . . . 667	Brandisite . . . v 461
Argillyte . . . v 316	Axinite . . . 285	Biharite . . . 424	Brandtite . . . p 84
Argyrite . . . s 40	Azorite . . . 832	Bindheimite . . 586	Braunite . . . 196
Argyrodite . . p 83	Azurite . . . 752	Binnite . . . 110	Bravaisite . . . p 84
Argyropyrite . p 83		Biotite . . . 289	Breccia . . . v 715
Aricite . . . s 872	BABEL QUARTZ	Bischofite . . . p 84	Bredbergite . . v 271
Arite 72A	v 231	Bismite . . . 222	Breislakite . . . v 238
Arkansite . . . s 198	Babingtonite . 242	Bismuth . . . 20	Breithauptite . 72
Arksutite . . . 165	Bagrathonite . v 278	Acicular . . . s 124	Brunnerite . . . v 718
Arminite . . . p 88	Baikalite . . . v 238	Arsenical . . . v 17	Brevicite . . . v 378
Arquerite . . . 10	Baikerinite . . 820	Blende . . . s 386	Brewsterite . . 395
Arrhenite . . . n 483	Baikerite . . . v 730	Glance . . . s 30	Brewsterlinite . 833
Arsenargente p 88	Ballesterosite . v 75	Nickel . . . s 55	Brittle Silver Ore
Arsenate of	Baltimorite . v 411	Ochre . . . s 222	s 130
Nickel . 508, 509	Bamlite . . . v 823	Silver . . . s 36	Brochantite . . 701
Arsenic 17	Barnceite . . . p 83	Telluric s 31 & 32	Brögerite . . . p 84
Antimonial v 17	Baretite . . . p 83	Bismuthinite . . 30	Bromargyrite s 142
Arsenical Anti-	Barite 630	Bismutite . . . 753	Bromide of Zinc 158
mony s 19	Barvikite . . . p 83	Bismutoferrite p 84	Bromite 727
Bismuth . . . v 17	Barnhardtite . . 79	Bismutosphærite p 84	Bromyrite . . . 142
Cobalt 71A	Barrandite . . 552	Bitter-spar . . s 716	Brongnartine . v 701
Copper s 37	Barrowite . . . n 310	Bitumen . . . s 830	Brongniardite . 111
Iron s 94	Bartholomite . 687A	Elastic . . . s 782	Bronzite v 234
Manganese s 73	Barylite p 83	Bituminous Coal v 831	Brookite 198
Nickel s 71	Barysil p 83	Black jack . . . s 56	Brossite v 716
Pyrites s 94	Barytes s 630	Black lead . . . s 25	Brown Coal . . . v 831
Silver s 35	Barytocalcite . 730	Black copper . s 178	Brown Hematite
Arsenicite . . s 520	Barytocelestite	Blackmorite . v 232	s 204, 206
Arseniopleite p 83	v 630 & 631	Blakeite . . . 676	Brucite 210
Arsenisiderite 570	Basalt v 311	Blende s 56	Brücknerellite 823
Arsenite . . . s 219	Basanite . . . v 231	Bloedite . . . 659	Brushite 518
Arsenocrocite s 570	Basanmelan . v 181	Blue Carbonate	Bucaramangite 801
Arsenolite . . 219	Bastite 412	of Copper . . s 752	Bucholzite . . . v 323
Arsenopyrite . 94	Bastnäsite . . 732A	Bucklandite . . p 84	Bucklingite . . v 278
Arsenotellurite 33A	Bastonite . . n 290	Blue vitriol . . s 669	Buhrstone . . . v 231
Arsenstibite . p 83	Bathvillite . . 803	Bobierite . . . 523A	Bunsenite . . . 174
Asbeferrite . . v 247	Batrachite . . v 258	Bodenite . . . 279A	Buratite v 750
Asbestos . . . v 247	Baudisserite . v 718	Bog Iron Ore	Bustantentite . p 84
Asbestos . . . v 247	Bavallite . . . n 469	v 206 & 213	Bustamite . . . v 241
Asbolite . . . v 218	Bayldonite . . 539	Bog Manganese v 218	Butyrellite . . . 821
Asmanite . . . 231B	Beaumontite . v 394	Bole v 420	Byerite 830F
Asparagus Stone v 492	Beauxite . . . 208	Bolivianite . . 135	Byssolite . . . v 247
Aspasolite . . v 423	Beccarite . . . v 272	Bolivite p 84	Bytownite . . . 310C
Asperolite . . s 346	Bechilite . . . 600	Bologna Stone v 630	
Asphalt s 830	Beckite v 231	Boltonite . . . v 257	CABOCLE . s 574A
Asphaltum . . 830	Beegerite . . . p 83	Bombiccite . . 805A	Cabrerite . . . 529
Aspidelite . . s 329	Bell Metal Ore s 80	Bonsdorffite . s 426	Cacholong . . . v 232
Aspidolite . . 288A	Belonesite . . p 83	Boracic Acid . . s 594	Cacoclasite . . . p 84
Asterosite . . v 238	Bementite . . p 83	Boracite 597	Cacoxenite . . . 569
Astrakanite . v 659	Benxole 788	Borax 599	Cadmium blende s 69
Astrophyllite . 292	Beraunite . . n 524	Bordite v 341	Cairngorm Stone
Atacamite . . 153	Berengelite . 830D	Bordosite . . . 144A	v 231
Atelastite . . 337	Bergamaskite v 247	Borickite . . . 576	Calaite s 563
Atelite p 83	Berg-butter . v 681	Bornine s 31	Calamine 361
Atheriastite . n 299	Bergmannite . v 378	Bornite 49	Calaverite . . . 98A
Atlasite 752A	Berlinite . . . 549	Borocalcite . . v 602	Calcareobarite v 630
Atopite p 83	Berthierine . v 469	Bosjemanite . . 680	Calcareous Spar s 715
Attacolite . . 561	Berthierite . . 104	Botallackite . v 153	Calcareous Tuff s 715
Auerbachite . 272E	Bertrandite . p 84	Botryogen . . . 687	Calciocelestite v 631
Auerlite . . . p 83	Beryl 254	Botryolite . . v 327	Calcioferrite . . 557
Augelite . . . 562	Beryllonite . p 84	Boulangerite . 122	Calcite 715
Augite v 238	Berzelianite . 50	Bournonite . . 119	Calc Sinter . . . v 715
Aurichalcite . 750	Berzeliite . . . 501	Boussingaultite 651	Calc Tufa v 715
Auripigment . s 27	Berzelite . . . s 151	Bowenite v 411	Calciothorite . p 84
Automolite . v 185	Beta-jaulingite 813A	Brackebuschite p 84	Calcozincite . . p 84
Autunite . . . 573	Beudantite . . 582	Bragite v 483	Calderite v 271
Avalite p 88	Beustite v 276	" 272F	Caledonite . . . 636

Callainite . . .	550	Chabazite . . .	386	Choniorite . . .	446	Colemanite . . .	p 84
Calomel . . .	186	Chalcantite . .	669	Chromatite . .	778	Collyrite . . .	375
Calypsolite . .	v 272	Chalcedony . .	v 231	Christianite . .	v 810	Colophonite . .	v 271
Campbellite near		Chalchihuitl . .	s 563	" . . .	s 389	Coloradoite . .	p 84
Chalypite . . .	p 84	Chalcocite . . .	61	Christophite . .	v 56	Columbite . . .	474
Campylite . . .	v 494	Chalcocite . . .	v 407	Chromchlorite .	v 448	Comptonite . .	v 377
Canaanite . . .	v 238	Chalcocite s572 & 573		Chrome Ochre . .	464	Conarite . . .	848
Cancrinite . . .	304A	Chalcomenite . .	p 84	Chromic Iron . .	s 189	Condurrite . .	v 37
Candite . . .	v 183	Chalcociclite . .	s 49	Chromite . . .	189	Confolensite . .	v 406
Cannel Coal . .	v 831	Chalcomorphite s70A		Chromowulfen- .		Conichalcite . .	538
Canтонite . . .	v 100	Chalcophanite p 84	ite	" . . .	v 617	Conite . . .	v 716
Caoutchouc,min- eral . . .	s 782	Chalcopyllite . .	548	Chrompicotite .	v 189	Connellite . . .	639
Capillary Pyr- ites . . .	s 66 & 90	Chalcopyrite . .	78	Chrysoberyl . .	191	Cookeite . . .	434
Capnite . . .	v 723	Chalcopyrhotite s68A		Chrysocolla . . .	346	Copalite . . .	798
Caporcianite . .	v 343	Chalcosiderite p 84		Chrysolite . . .	259	Copiapite . . .	683
Capped Quartz v	231	Chalcosine . . .	s 61	Iron . . .	s 260	Copper . . .	12
Cappelenite . .	p 84	Chalcostibite . .	101	Iron-Manga- nese . . .	261	Antimonial . .	s 101
Caracolate . . .	p 84	Chalcotrichite .	v 172	Titaniferous . .	v 257	Arsenical . . .	s 37
Carbonado . . .	v 24	Challite . . .	v 377	Chrysophane . .	v 461	Black . . .	s 178
Carbuncle . . .	v 271	Chalk . . .	v 715	Chrysoprase . .	v 231	Glance . . .	s 61
Carbunculus . .	v 179, 183 & 271	Chalybite . . .	s 721	Chrysoprase . .	v 231	Gray . . .	s 126
Chamasite . . .	v 13	Chalypite . . .	p 84	earth . . .	v 466	Indigo . . .	s 101
Chamoisite . .	469	Chamasite . . .	v 13	Chrysotile . . .	v 411	Mica . . .	s 548
Chanarcillite .	v 35	Chamotte . . .	469	Churchite . . .	521	Nickel . . .	s 71
Charmite . . .	v 61	Chancite . . .	35	Cimolite . . .	404	Pyrites . . .	s 78
Charmite . . .	502	Chathamite . .	v 83	Cinnabar . . .	64	Red . . .	s 172
Carnallite . . .	147	Chelmsfordite .	v 299	Cinnamon-stone	v 271	Uranite . . .	s 572
Carnat . . .	v 419	Chenevixite . .	567	Cirrolite . . .	559	Variegated . .	s 49
Carnatite . . .	v 311	Cherokine . . .	v 493	Citrine . . .	v 231	Velvet . . .	s 703
Carnelian . . .	v 231	Chert . . .	v 231	Clarite . . .	p 84	Vitreous . . .	s 61
Carolathine . .	n 374	Chessy Copper . .	s 752	Claudette . . .	221A	Vitriol . . .	s 669
Carpholite . . .	373	Chessylite . . .	s 752	Clausthalite . .	45	Copperas . . .	s 664
Carphosiderite	692	Chesterlite v Mi- crocline . . .	p 87	Clay . . .	s 419	Coprolites . .	492B
Carphostilbite	v 377	Chiastolite . .	v 322	Clayite . . .	134	Coquimbite . .	672
Carrara Marble v	715	Chialite . . .	560	Cleavelandite .	v 315	Coracite . . .	v 190
Carrollite . . .	82	Childrenite . .	560	Cleophrane . .	v 56	Corallinerz . .	v 64
Caryinite . . .	p 84	Chileite . . .	623	Cleveite . . .	p 84	Cordierite . . .	s 287
Caryopillite . .	p 84	Chileneite . . .	v 204	Cliftonite . . .	p 84	Corkite . . .	s 582
Cassinite . . .	v 816	Chiolite . . .	166	Clingmanite . .	v 459	Corneine . . .	v 247
Cassiterite . . .	192	Chiviatite . . .	108	Clinkstone . . .	v 816	Cornwallite . .	545
Cassiterotantal- ite . . .	v 473	Chladnite . . .	v 234	Clinoclhire . . .	s 450	Coronguite . .	p 84
Castellite . . .	n 329	Chloanthite . .	v 83	Clinoclasite . .	547	Corundellite . .	v 459
Castillite . . .	51	Chloralluminite p	84	Clinocrocite . .	p 84	Corundophilite	457
Castorite . . .	v 244	Chlorapatite . .	v 492	Clinohumite . .	319	Corundum . . .	179
Catapleilite . .	344	Chlorastrolite .	364	Clinophaeite . .	p 84	Corynne . . .	88
Cataspilite . .	423	Chloride of Mag- nesium . . .	155	Clintonite . . .	v 461	Cosalite . . .	112A
Catlinite . . .	p 84	Chloride of Man- ganese . . .	156	Cluthalite . . .	v 383	Cossyrite . . .	p 84
Cat's-eye . . .	v 231	Chlorite see 452 etc		Coal, Mineral . .	831	Cotterite . . .	v 231
Cavolinite . . .	v 304	Chlorite-like Min- eral . . .	444	Brown . . .	v 831	Cotunnite . . .	145
Cawk . . .	v 630	Chlorite-like Min- eral from N. C.	453	Cannel . . .	v 831	Couzeranite . .	v 302
Celadonite . . .	410	Chlorite-like Min- eral . . .	444	Cobalt, Arsenical	71A	Covellite . . .	100
Celestialite . .	p 84	Chloritoid . . .	458	Black . . .	v 218	Crednerite . . .	200
Celestite . . .	631	Chloritoid . . .	458	Bloom . . .	s 526	Crichtonite . .	v 181
Celestobarite .	v 630	Chloritoid . . .	458	Earthy . . .	v 218	Crispate . . .	v 193
Cellular Pyrites	v 90	Chlorocalcite . .	p 84	Glance . . .	s 85	Cristobaltite .	p 84
Centrallassite .	341A	Chloromagnesite p	84	Gray . . .	s 83	Crocalite . . .	v 878
Cerargyrite . .	140	Chloropal . . .	408	Ochre . . .	s 626	Crocidolite . .	249
Cerassinite s 151	& 783	Chlorophane . .	v 159	Pyrites . . .	s 81	Crocoisite . . .	s 642
Cerbolite . . .	s 651	Chlorophane . .	v 159	Vitriol . . .	s 667	Crocoite . . .	642
Cerine . . .	v 278	Chlorophane . .	v 159	Cobaltite . . .	85	Cronstedtite . .	456
Cerinite . . .	n 394	Chlorophane . .	v 159	Cobaltomenite p	84	Crookesite . . .	48
Cerite . . .	367	Chlorophane . .	v 159	Coccinite . . .	144	Cross Stone . .	s 322
Cerolite . . .	414	Chlorophane . .	v 159	Coccolite . . .	v 238	Cryolite . . .	164
Cerussite . . .	729	Chlorophane . .	v 159	Cockscomb Pyri- tes . . .	s 90	Cryophyllite . .	295
Cervantite . . .	227	Chlorophane . .	v 159	tes . . .	s 90	Crypholite . .	p 84
Ceylanite . . .	v 183	Chlorophane . .	v 159	Coerulmolactite	554C	Cryptohalite .	p 84
Ceylonite . . .	v 183	Chlorophane . .	v 159	Cog Wheel Ore s	119	Cryptolinite . .	834
		Chlorophane . .	v 159	Cohenite . . .	p 84	Cryptolite . . .	491
		Chlorophane . .	v 159	Coke . . .	v 381	Cryptomorphite	603

Cubanite . . .	77	Desmine . s	391, 392	E	EARTH	Cal-	Eriochalcite . p	85
Cube Ore . . .	s 558	Destinezite . p	85	mine . . .	s 749	Ersbyite . . .	n 816	
Cuboite . . .	v 388	Devilline . .	v 702	Cobalt s Asbo-	lite . . .	Erubescite . .	s 49	
Culsageeite . .	v 447	Dewalquite . s	284A	lite . . .	v 218	Erythrite . . .	526	
Cumengite . . .	s 229	Deweyite . . .	413	Manganese . s	218	" . . .	v 316	
Cummingtonite .	v 247	Diabantite . .	p 85	Edelforsite . .	287A	Erythrosiderite	148A	
		Diabase . v	247, 311	Edelite . . .	v 363	Erythrosincite .	v 70	
Cuprite . . .	172	Diaclasite . .	236	Edenite . . .	v 247	Echerite . . .	v 276	
Cuproapatite . .	v 492	Diadelphite . p	85	Edingtonite . .	371	Esmarkite . . .	v 426	
Cuprocalcite . p	84	Diadochite . .	580	Edisonite . . .	p 85	& 310		
Cuprodesclowitzite		Diallage . v	238, 247	Edwardsite . .	v 496	Essonite . . .	v 271	
	v 620	hydrous . . .	v 238	Egeran . . .	v 273	Ettringite . . .	688A	
Cupromagnesite .		Diallogite . .	s 722	Eggonite . . .	p 85	Eucairite . . .	42	
	669A	Diamond . . .	24	Ehlite . . .	v 543	Euchlorite . . .	v 289	
Cuproplumbite .	44B	anthracitic . v	24	Ehrenbergite .	404B	Euchroite . . .	540	
Cuproscheelite .	615	black . . .	v 24	Eichwaldite . .	p 85	Euclase . . .	326	
Cuprotungstite .	615A	Dianite . . .	v 474	Eisenbrucite . .	v 210	Eucolite . . .	v 255	
Cuprovanadite . s	623	Diaphorite . .	113A	Eisenrose . v	180, 181	Eucrasite . . .	p 95	
Cuspidine . . .	p 84	Diaspore . . .	203	Ekdemite . . .	p 85	Eucryptite . . .	p 85	
Cyanite . . .	324	Diasstatite . .	v 247	Ekebergite . . .	300	Eudialyte . . .	255	
Cyanochoiroite .	670	Dicroite . . .	s 287	Ekmanite . . .	436	Eudnophite . .	384	
Cyanolite . . .	341B	Dickinsonite . p	85	Elæolite . . .	v 804	Eukamptite . .	n 428	
Cyanosite . . .	s 669	Didymite . . .	v 293	Elastic Bitumen	s 782	Eulytite . . .	386	
Cyanotrichite .	708	Nietrichite . .	p 85	Elaterite . . .	782	Eumante . . .	198A	
Cyclopeite . . .	v 238	Dihydrite . .	v 543	Electrum . . .	v 1	Euosmite . . .	807	
Cyclopote . . .	310A	Dihydrothenar-		" . . .	s 799	Euphyllite . .	432	
		dite . . .	p 85	Eleonorite . . .	n 524	Euralite . . .	v 449	
Cymatolite . . .	v 401	Dillenburghite .	v 346	Elhuyarite . .	v 374	Eusynchite . .	v 619	
Cyprine . . .	v 273	Dillnite . . .	375A	Eliaite . . .	209	Euxenite . . .	479	
Cyprite . . .	s 61	Dillmagetite .	185A	Ellagite . . .	380	Evansite . . .	571	
Cyprusite . . .	p 84	Dimorphite . .	28	Elpasolite . .	p 85	Evigtokite . .	v 170	
Cyrtolite . . .	272B	Dinite . . .	786	Elroquite . . .	p 85	Exanthalose . .	v 653	
DAHLITE . p	84	Diopside . . .	v 238	Embolite . . .	141	FACELLITE . p	85	
Dalarnite . v	94	Diopase . . .	345	Embrithite . .	v 122	Fahlerz . . .	s 125	
Daleminzite . .	59	Dioxyrite . . .	s 641	Emerald . . .	v 254	Fahlunite . . .	426	
Damourite . . .	430	Diaphanite . .	v 459	Copper . . .	s 345	Fairfieldite . .	p 85	
Danaite . . .	v 94	Dipyre . . .	302	Nickel . . .	s 747	Famatinitite . .	132B	
Danalite . . .	270	Disterrite . .	v 461	Emery . . .	v 179	Famatinite . .	387	
Danburite . . .	286	Disthene . . .	s 324	Emerylite . . .	s 459	Fargite . . .	v 378	
Dannemorite . v	247	Dog-tooth Spar	v 715	Emmonite . . .	v 728	Faröelite . . .	v 377	
Dark Red Sil-		Dolerophanite .	634B	Emmonsite . .	p 85	Fassaite . . .	v 238	
ver Ore . . .	s 117	Dolomite . . .	716	Empholite . .	p 85	Fausaitite . . .	385	
Darwinite . . .	s 39	Domeykite . .	37	Emplectite . .	102	Fauserite . . .	663	
Datolite . . .	327	Dopplerite . .	820A	Enargite . . .	182	Fayalite . . .	260	
Dauberite . . .	s 708	& 826	Encladite . .	v 606	Feather Alum .	s 681		
Daubréelite . p	84	Doranite . . .	v 386	Endlichite . .	p 85	Ore . . .	s 112	
Daubreite . . .	p 84	Doubly-refract-		Engelhardtite .	v 272	Feldspar, Com-		
Davidsonite . .	v 254	ing Spar . . .	v 715	Enstatite . . .	234	mon . . .	s 316	
Daviesite . . .	p 84	Dreelite . . .	637	Enysite . . .	p 85	Lime . . .	s 311	
Davite . . .	v 671	Dry-bone . . .	s 723	Eosite . . .	617A	Potash . . .	s 316	
Davreuxite . .	p 84	Ducktownite .	v 79	Eosphorite . .	v 560	Soda . . .	s 315	
Davyne . . .	v 304	Dudgeonite . .	p 85	Ephesite . . .	n 459	Felsite . v	315 & 316	
Dawsonite . . .	p 85	Dudleyite . .	459A	Epiboulangerite	122A	Felsobanyite . .	695	
Dechenite . . .	619	Dufrenite . . .	568	Epichlorite . .	441	Ferberite . . .	612	
Degeröite . . .	v 435	Dufrenoyssite .	113	Epidote . . .	276	Fergusonite . .	483	
Delanovite . .	v 406	Dumasite . . .	455A	Epigenite . . .	132A	Ferrocalcite . .	v 715	
Delafossite . .	178A	Dumortierite .	p 85	" . . .	p 85	Ferrocobaltite .	v 85	
Delawarite . .	v 316	Dumreicherite .	p 85	Epiglaubeite .	n 519	Ferroilmenite .	v 474	
Delessite . . .	449	Duporphite . .	p 85	Epiphanite . .	v 289	Ferronatrinite .	p 85	
Delphinite . .	v 276	Durangite . .	503A	Epiphosphorite	492E	Ferrostibian . .	p 85	
Delvauxite . .	v 568	Dürfeldtite . .	p 85	Epistilbite . .	393	Ferrotantalite .	v 473	
Demidofite . .	v 346	Duxite . . .	p 85	Epsomite . . .	661	Ferrotellurite .	p 85	
Derbyshire Spar		Dysanallyte . .	p 85	Epsom Salt . .	s 661	Ferrotitanite .	s 334	
	s 159	Dyscrasite . .	85	Erdmannite . .	368	Fettbol . . .	v 408	
Dermatin . . .	415A	Dysluite . . .	v 185	" . . .	v 278	Fibroferrite . .	685	
Dernbachite . .	s 582	Dysodile . . .	818	Eremite . . .	v 496	Fibrolite . . .	323	
De Saulesite . p	85	Dyssonite . .	v 241	Erinite . . .	544	Fichtelite . . .	784	
Desclowitzite . .	620	Dysyntribite .	v 422	" . . .	v 406	Ficinitite . . .	585	

Fiedlerite . . . p 85	Gay-Lussite . . . 789	Grochauite . . . 458B	Herderite . . . 504
Fieldite . . . 125A	Gearsautite . . . 170	Groddeckite . . . v 887	Hermannolite v 474
Fillowite . . . p 85	Gedante . . . p 85	Groppite . . . 427	Herrengrundite
Florite . . . v 232	Gedrite . . . v 246	Grorollite . . . v 218	p 86
Fireblende . . . s 115	Gehlenite . . . 821	Grossularite . . . v 271	Herschelite . . . 388
Fire Marble . . . v 715	Genthite . . . 416	Grothite . . . 330	Hessenbergite . . . 835
Fire Opal . . . v 232	Geocerallite . . . 822	Grünauite . . . 55	Hessite . . . 58
Fischerite . . . 565	Geocerite . . . 796	Grünerite . . . v 247	Heterolite . . . p 86
Flexible Sand- stone . . . v 231	Geocronite . . . 129	Guadalcazarite . . . 65B	Heterocline . . . n 241
Flexible silver ore . . . v 63	Geomyricite . . . 797	Guanajuatite . . . p 85	Heterogenite . . . v 218
Flinkite . . . p 85	Gerhardtite . . . p 86	Guanapite . . . p 85	Heteromerite v 278
Flint . . . v 231	Gersdorffite . . . 86	Guanite . . . s 516	Heteromorphite
Float-stone . . . v 232	Geyerite . . . v 93	Guano . . . 492D	v 112
Flos ferri . . . v 724	Geyerite . . . v 232	Guanovulite . . . 652A	Heterosite . . . n 498
Fluellite . . . 163	Gibbsite . . . 212	Guarinite . . . 328	Heubachite . . . p 86
Fluocerine . . . 162	Gibraltar Stone v 715	Guayacanite . . . s 132	Heulandite . . . 394
Fluocerite . . . 161	Giesekite . . . v 422	Guejarite . . . p 85	Hexagonite . . . v 247
Fluor . . . s 169	Gigantolite . . . v 422	Guitermanite . . . p 85	Hibbertite . . . n 742
Fluor-apatite . . . v 492	Gilbertite . . . 429A	Gümbelite . . . 422A	Hiddenite . . . v 243
Fluorite . . . 169	Gillingite . . . 439	Gummite . . . 216	Hielmite . . . 476
Fluor Spar . . . s 169	Gilsonite . . . v 830	Gurhofite . . . v 716	Hieratite . . . p 86
Foliated Tel- lurium . . . s 99	Ginlsite . . . p 85	Guyaquillite . . . 813	Hircite . . . 819
	Girasol . . . v 232	Gymnite . . . s 413	Hisingerite . . . 435
	Gismondite . . . 372	Gypsum . . . 654	Hislopite . . . v 715
	Giufite, s Milarite	Gyrolite . . . 342	Hitchcockite . . . v 556
Fontainebleau Limestone v 715	Glagerite . . . v 420	HADDAMITE n 472	
Forbesite . . . 528	Glass, Volcanic v 316		
Forcherite . . . v 232	Glaubapatite v 492D	Haemafibrite	Hohmannite . . . p 86
Foresite . . . 392A	Glauberite . . . 640	s Amafibrite p 83	Holmite . . . s 461
Forsterite . . . 267	Glaucodot . . . 95	Hafnefordite v 314	Homichlin . . . n 79
Fortification	Glaucolite . . . v 299	Hagemannite . . . 169A	Homilite . . . p 86
Agate . . . v 231	Glaucophane . . . 251	Haidingerite . . . 517	Honestone . . . v 231
Fowlerite . . . v 241	Glaucopyrite . . . 93A	Halite . . . 138	Hopeite . . . 500
Francolite . . . v 492	Glinkite . . . v 259	Hallite . . . 445C	Horbachite . . . 81A
Franklandite . . . p 85	Globosite . . . n 568	Halloysite . . . 420	Hornblende . . . s 247
Franklinite . . . 188	Glockerite . . . 696	Halotrichite . . . 681	Horn Quicksil- ver . . . s 136
Fredricite . . . v 127	Glossocollite . . . v 420	Hamartite . . . s 732A	Horn Silver . . . s 140
Freibergite . . . v 125	Glottalite . . . v 371	Hanksite . . . p 86	Hornstone . . . v 231
Freieslebenite . . . 114	Göthite . . . 204	Hannayite . . . p 86	Horse-flesh ore s 49
French Chalk . . . v 399	Göthite . . . 204	Harmotome . . . 390	Horsfordite . . . p 86
Freyalite . . . p 85	Göthite . . . 204	Harringtonite v 381	Hortonite . . . v 399
Friedelite . . . p 85	Göthite . . . 204	Harrisite . . . 61C	Hortonolite . . . 259A
Friesite . . . p 85	Göthite . . . 204	Harstigitite . . . p 86	Houghtite . . . v 214
Frigidite . . . n 125	Göthite . . . 204	Hartin . . . v 805	Hovite . . . 744
Fritzscheite . . . n 573	Göthite . . . 204	Hartite . . . 785	Howlite . . . 601
Frugardite . . . v 273	Göthite . . . 204	Hatchettite . . . 779	Huantajayite . . . v 138
Fuchsita . . . v 293	Göthite . . . 204	Hatchettolite . . . p 86	Huascolite . . . 44A
Fulgurite . . . v 231	Göthite . . . 204	Hauverite . . . 76	Hübnerite . . . 611
Fuller's Earth v 405	Göthite . . . 204	Haughtonite . . . v 289	Hudsonite . . . v 238
Fullonite . . . v 204	Göthite . . . 204	Hausmannite . . . 195	Hullite . . . n 449
Funkite . . . v 238	Göthite . . . 204	Haüyite . . . 307	Humboldtite v 274
	Graphic Gold . . . s 98	Haydenite . . . v 386	Humboldtine . . . 758
GABRONITE n 299	Tellurium . . . s 98	Hayesine . . . v 602	Huminite . . . p 86
Gadolinite . . . 282	Graphite . . . 25	Haytorite . . . v 231	Humite . . . v 319
Gahnite . . . 185	Grastite . . . v 450	Heavy Spar . . . s 630	Hunterite . . . v 404
" . . . v 273	Graulite . . . s 662A	Hebronite . . . v 503	Huntlite . . . p 86
Galactite . . . v 378	Gray Antimony	Hedenbergite . . . v 238	Huresaultite . . . 531
Galapectite . . . v 420	s 29 & 90	Hedyphane . . . v 494	Huronite . . . v 310C
Galena . . . s 44	Cobalt . . . s 83	Heliotrope . . . v 231	and 426
Galenite . . . 44	Copper . . . s 125	Heleminthe . . . v 452	Huyssenite . . . 597A
Galenobismutite	Green Carbon ate	Heliophyllite . . . p 86	Hverlora . . . 420E
p 85	of Copper . . . s 751	Helvite . . . 269	Hversalt . . . v 681
Gallitzenite . . . s 666	Green Vitriol . . . s 664	Hematite . . . 180	Hyacinth . . . s 272 & c
Gamsigradite . . . v 247	Greenlandite . . . s 474	" Brown s 206	Hyalite . . . v 232
Ganomalite . . . p 85	Greenockite . . . 69	Henryite . . . v 48	Hyalomelan . . . 253A
Garnet . . . 271	Greenovite . . . v 329	Henwoodite . . . p 86	Hyalophane . . . 813
Garnierite . . . 416A	Grenesite . . . v 452	Hepatinerz . . . v 172	Hyalosiderite v 259
Gastaldite . . . p 85	Griqualandite s 249	Hercynite . . . 184	Hyalotekite . . . p 86

Hyblite . . . v 425	Iridosmine . . . 7	Keramohalite . v 671	Laxmannite . 644A
Hydrargillite . v 212	Iron . . . s 681	Kermesite . 226	Lazulite . . . 551
Hydrargyrite p 86	Alum . . . s 681	Kerosene . . 761 &c	Lazurapatite . v 492
Hydraulic Lime- stone . . . v 715	Arsenical . s 684	Kerrite . . . 447A	Lazurfeldspar v 816
Hydroapatite . 492G	Magnetic . s 136	Kerstenite . 712	Lead . . . 15
Hydroboracite 596	Meteoric . v 13	Kibdelophane . v 181	Black . . . s 25
Hydrocastoriten 244	Ochre . . . v 180	Kidney Ore . . v 180	Vitriol . . s 683
Hydrocerussite p 86	Pyrites . . s 75	Kieserite . . . 655	Leadhillite . 636
Hydrochlore . v 471	Sinter . . . s 553	Kilbrickenite . v 129	Lecontite . . 652
Hydrocuprite p 86	Titan . . . s 181	Killinite . . . v 422	Ledererite . . v 387
Hydrocyanite 634A	Iserite . . . 181A	Kischtimite . 732	Lederite . . . v 329
Hydrodolomite 741	Isinglass s Mica	Kjerulfsite . v 495	Leelite . . . v 316
Hydrofluorite p 86	Isoclasite . . 520B	Klaprotholite 121A	Lehrbachite . 47
Hydrofranklin- ite p 86	Isopyre . . . 338A	Klipsteinite . 468	Lehunite . . v 378
Hydrogiobertite p 86	Itacolomite . v 231	Knebelite . . 263	Leidyite . . . p 86
Hydrohalite . p 86	Ittnerite . . . v 307	Knoxvillite . p 86	Lenzinite . . v 420
Hydroilmenite v 181	Irvigite . . . 431A	Kobellite . . . 123	Leonhardite . 343A
Hydrolite . . s 387	Ixolite . . . v 478	Kochelite . . 488A	Leopoldite . . v 137
Hydromagnesite 740	Ixolyte . . . 787	Koelbingite . 276A	Lepidocrocite v 204
Hydronephelite p 86	JACKSONITE v 363	Kokscharofite 274B	Lepidolite . . 294
Hydrophane . v 232	Jacobsite . 188A	Kollophan . . 518A	Lepidomelane 290
Hydrophilite s	Jade v 247, 280, 280A	Kongbergite . 10A	Lepidophaeite p 86
Chlorocalcite p 84	Jadeite . . . 280A	Königite . . . v 701	Lepolite . . . v 310
Hydrophite . 415	Jalpaite . . . 40B	Könlite . . . 793	Leucaugite . . v 238
Hydroplumbite p 86	Jamesonite . 112	Koppite . . . 471A	Leuchtenbergite 451
Hydrorhodonite p 86	Jargon . . . v 272	Korarfveite . 496A	Leucite . . . 309
Hydrosulphate 349A	Jarosite . . . 691	Korite . . . v 425	Leucochalcite p 86
Hydrosteatite v 399	Jasper . . . v 231	Kotschubeite . v 450	Leucocyclite . v 370
Hydrotalc . . v 448	Jaulingite . s 809	Köttigite . . . 530	Leucomaniganite
Hydrotalcite . 214	Jefferisite . 447	Krabbite . . . v 316	s Fairfieldite p 85
Hydrothreosite 262A	Jeffersonite . v 238	Krantzite . . 799A	Leucopetrite . 806
Hydrotitanite n 182	Jelletite . . v 271	Kraurite . . . v 568	Leucophanite . 264
Hydrozincite . 749	Jenkinsite . v 415	Kreittonite . v 185	Leucopyrite . . 93
Hydrous Antho- phyllite . . v 247	Jenischite . 233	Kremersite . 149	Leucotile . . . p 86
Hypophyllite 442B	Jeremejffite . p 86	Krennerite . p 86	Levigianite . v 64A
Hypargyrite . v 108	Jet v 831	Krisuvigite . v 701	Levynite . . . 382
Hypersthene . 235	Jevreinoffite . v 273	Kroberite . . n 68	Lherzolite . . v 133
Hypoehlorite . 338	Jogynaite . v 553	Krönnkite . p 86	Libethenite . 535
Hypoclerite . v 315	Johannite . 705	Krugite . . . v 656	Liebenerite . v 422
Hypoclerite . v 315	Johnstonite . v 44	Kupfferite . 245	Liebigite . . . 754
Hypostillbite . 391	Jollyte . . . 440	Küstelite . . v 2	Lievrite . . . s 284
Hystatite . . v 181	Jordanite . 107	Kyrosite . . . v 90	Lignite . . . v 831
	Josite . . . 32		Ligurite . . . v 329
	Jossaite . . . 645		Lillite 443
IBERITE . . . v 422	Julianite . . 127A	LABRADORITE 311	Limonite . . . 218
Iceland Spar v 715		Lagonite . . . 605	Limbachite . 414A
Idocrase . . . v 273		Lampadite . . v 218	Lime Feldspar s 810
Idrialite . . . 795		Lamprophanite 697	Malachite . 751B
Igelströmite . s 215		Lanarkite . . 641	Limestone . . v 715
Ihélite . . . p 86		Lancasterite . v 740	hydraulic . v 715
Ildfonsite . . v 473		Langbanite . p 86	magnesian . v 716
Ilmenite . . . p 86		Langite . . . 702	Limnite . . . 213
Ilmenite . . . v 181		Lansfordite . p 86	Limonite . . . 206
Ilmenorutile . v 193		Lanthanite . . 745	Linarite . . . 700
Ilsemanite . 224A		Lanthanocerite v 367	Liodackerite . 583
Ilvaite 284		Lapis-Lazuli . 306	Lindsayite . . v 310
Indianite . . v 320		Larderellite . 604	Linnæite . . . 81
Indigo Copper s 101		Lasionite . . . v 554	Linselite . . . v 310
Inesite p 86		Latrobite . . v 310	Lintonite . . v 377
Inolite v 715		Laubanite . . p 86	Lionite v 21
Iodobromite p 86		Laumontite . 343	Liroconite . . 542
Iodide of Zinc 157		Laurionite . . p 86	Liskeardite . p 86
Iodyrite . . . 143		Laurite 89	Lithiophilite . v 498
Iolite 287		Lautite . . . p 86	Lithiophorite . 218D
Ionite p 86		Lava v 316	Lithographic
Iridium s 7		Lavendulan . 526B	Stone v 715
		Lavenite . . . 831	Lithomarge . v 419
		Lavroffite . . v 238	Livingstonite 29A
		Lawrencite . . p 86	Loboite v 273

Lodestone . . . v 186	Mangantantalite	Metacinnabarite 64A	Moresnetite . . . 361A
Loganite . . . v 448	Marasmolite . . v 56	Metastibnite . . p 87	Moronolite . . . v 691
Löllingite . . . 91	Marble . . . v 715	Metaxite . . . v 411	Moroxite . . . v 492
Lonchidite . . v 90, 94	Marcasite . . . 90	Metaxoite . . . v 446	Morvenite . . . v 390
Lophoite . . . v 452	Marceline v 196, 241	Meteorite Iron v 13	Mossandrite . . . 283
Lotallite . . . v 238	Marcelite . . . n 178	Meymacite . . . 225A	Moss Agate . . . v 231
Löweite . . . 660	Marekanite . . v 316	Miargyrite . . . 108	Mossottite . . . v 724
Löwigite . . . 690	Margarite . . . 459	Mica s 293, 289, etc	Mottramite . . . p 87
Loxoclase . . . v 316	Margarodite . . 429	Lithia . . . s 294	Mountain Cork v 247
Lucasite . . . v 445A	Marialite . . . 303	Micaceous Iron	Mountain Lea-
Luckite . . . v 664	Marionite . . . v 749	Ore . . . v 180	ther . . . v 247
Lucullite . . . v 715	Mariposite . . v 293	Michaelite . . . v 282	Müllerite . . . v 98
Ludlamite . . . p 86	Marl . . . v 715	Michaelsonite 279B	Muller's Glass v 232
Ludwigite . . 595A	Marmatolite . . p 87	Michel-Lévyte p 87	Mullicite . . . v 524
Lumachelle . . v 715	Marmatite . . . v 56	Microbromite v 141	Mundic s 75 and 90
Lüneburgite . 598A	Marmolite . . . v 411	Microcline . . . p 87	Murchisonite . v 316
Luzonite . . . v 182	Martinite . . . p 87	Microlite . . . 472	Muriacite . . . v 682
Lydian Stone . v 281	Martinsite . . . v 138	Microsommitte 305A	Muriomontite . 279
Lyellite . . . v 702	Martite . . . 180A	Middletonite . 814	Muscovite . . . 293
Lythrodos . . v 422	Martite . . . 180A	Miemite . . . v 716	Mussite . . . v 238
	Mascagnite . . . 660	Miesite . . . v 493	Myelin . . . n 322
MACLE . . . v 322	Maskelynite . 309A	Milarite . . . p 87	Mysorin . . . 751A
Maclureite	Masonite . . . v 468	Millerite . . . 66	
v 288, s 319	Massicot . . . 177	Miloschite . . . 465	NACRITE . . v 293
Maconite . . . 447B	Matlockite . . 160	Mimetite . . . 494	" . . . s 419
Magnesia Alum	Matricite . . . p 87	Mineral, agaric v 715	Nadorite . . . 510
s 678	Maxite . . . 635A	Caoutchouc s 782	Naesumite . . n 426
Magnesian Lime-	Mazapillite . . p 87	Charcoal . . . v 831	Nagyagite . . . 99
stone . . . v 716	Medjdidite . . 707	Coal . . . 881	Nail-head Spar v 715
Magnesiöferrite 187	Meerschäuminite	Oil . . . s 761 etc	Namaqualite . 214A
Magnesite . . . 718	Meerschaum . v 402	Pitch . . . s 830 etc	Nantokite . . . 146A
Magnetic Iron s 186	Megabasite . . 613	Resin . . . s 798 etc	Napalite . . . p 87
pyrites . . . s 68	Megabromite . v 141	Tallow . . . s 779	Naphtha . . . 761 etc
Magnetite . . . 186	Meionite . . . 297	Tar . . . s 774 etc	Naphthalin . . 794
Magnochromite v 189	Melaconite . . . 178	Wax . . . s 780 etc	Natrolcalcite . v 715
Magnoferrite . s 187	Melanchlor . n 498	Minium . . . 197	Natrolite . . . 378
Magnolite . . . p 86	Melanellite . . 827	Mirabilite . . . 653	Natron . . . 736
Malachite . . . 751	Melanhydrite v 425	Miriqidite . . . p 87	Natrophilite . v 498
Blue . . . 752	Melanite . . . v 271	Misenite . . . 628	Naumannite . 41
Green . . . s 751	Melancroite . p 87	Mispickel . . . s 94	Necronite . . . v 316
Lime . . . 751B	Melanophlogite p 87	Misy . . . s 688	Needle-Ironstone
Malaccolite . . v 238	Melanosiderite p 87	Mixite . . . p 87	ore . . . s 124
Malacoon . . . 272A	Melanotekite . p 87	Mizzonite . . . 301	spar . . . s 724
Maldonite . . . 1A	Melanothallite p 87	Mocha-stone . v 231	stone . . . s 378
Malinofskite . v 125	Melanterite . . 664	Mohsite . . . v 181	zeolite . . . s 378
Mallardite . . p 86	Melilite . . . 274	Molybdate of	lead . . . s 617
Malthacite . . v 405	Melinite . . . 420B	Molybdenite . 34	Nefedieffite . . 404E
Mamanite . . . 657	Meliphanite . 268	Molybdic Ochres 224	Neft-Gil . . . 781B
Mangan	Mellite . . . 828	Molybdomenite p 87	Nemalite . . . v 210
Amphibole . s 241	Melonite . . . 100A	Molsite . . . 146	Neochrysolite v 259
Blende . . . s 52	Melopseite . . 420G	Monazite . . . 496	Neotese . . . v 558
Epidote . . . s 277	Menaccanite . 181	Monazitoid . . v 496	Neotype . . . v 715
Manganese	Mendipite . . . 151	Monetite . . . p 87	Nephelie . . . 804
Alum . . . s 679	Mendosite . . . 677	Monimolite . . 505	Nephrite . . . v 247
Black . . . s 195	Meneghinite . 128	Monradite . . . 856	Nertschinskite v 420
Blende . . . s 52	Mengite . . . 485	Monrolite . . . v 323	Nesquehonite . p 87
Bog . . . s 218	Menilite . . . v 232	Montanite . . . 711	Neudorfite . . p 87
Earthy . . . s 218	Mercury . . . 8	Montebrasite . v 508	Neurolite . . . 423A
Gray . . . s 199	Meroxene . . . v 289	Monticellite . 258	Newberyite . . p 87
Spar . . . s 241	Mesitite . . . 719	Montmartrite v 654	Newjanskite . . v 7
Manganite . . . 205	Mesole . . . v 377	Montmorillonite 406	Newkirkite . . v 205
Manganocalcite 725	Mesolin . . . s 882	Monzonite . . . p 87	Nicochromite p 87
" . . . v 715	Mesolite . . . 381	Moonstone v 814, 815	Niccolite . . . 71
Manganophyllite	Mesotype s 377, 378	Messelite . . . p 87	etc Nickel, antimo-
290A	Messelite . . . p 87	Metabrushite 519	nial . . . s 72
Manganosiderite	Metachlorite . 455	Mordenite . . . 396	arsenical . . . s 71
v 722		Morenosite . . . 668	

Nickel, copper s 71	Oölite . . . v 715	Pearl Spar . . . s 716, 717	Picrosmine . . . 349
emerald . . . s 747	Oösite . . . v 422	Pearlstone . . . v 316	Picrotananite . . v 181
gymnite . . . s 416	Opal 232	Peat v 381	Picrotephroite v 262
ochre s 527	Agate v 232	Peckhamite . . p 87	Picrothomson-ite . . . n 377
vitriol s 668	Allophane . . s 376	Pectolite . . . v 339	Pictite v 329
Nigrescite . . 247D	Fire v 232	Peganite 564	Piddingtonite 246A
Nigrine v 193	Noble v 232	Pelé's Hair . . v 316	Piedmontite . . . 277
Niobite s 474	Precious . . v 232	Pelicanite . . v 404	Pigotite 829
Nitre 590	Semi- v 232	Pelocoonite . . v 218	Pihlrite 401
soda 591	Opalized Wood v 232	Pencatite 743	Pilarite v 346
Nitrobarite . . p 87	Ophiolite . . v 411	Pennine s 448	Pilinite p 87
Nitrocalcite . . 592	Opsimose . . v 468	Penninite 448	Pilolite p 87
Nitroglauberite p 87	Orangite . . . v 366	Pennite v 741	Pimelite 466
Nitromagnesite 593	Oravitze . . . 420D	Pentlandite . . 54	Pinguite v 408
Nivenite p 87	Orleyite . . . p 87	Penwithite . . p 87	Pinite 422
Noble Opal . . . v 232	Ornithite . . . v 519	Peplolite v 426	Pinitoid v 422
Serpentine . . v 411	Oropion v 420	Percyite 154	Pinnite p 87
Nocerite p 87	Orpiment . . . 27	Periclasite . . . 173	Piotine v 417
Nohlte 478A	Orthite v 278	Pericline v 315	Pipestone
Nontronite . . v 408	Orthoclase . . 316	Peridot s 259	s Catlinite p 84
Noralite v 247	Oryzite v 394	Peristerite . . v 315	Pisanite 665
Nordenskiöldite	Osbornite . . . p 87	Perofskite . . . 182	Pisolite v 715
p 87	Oserskite . . . v 724	Perthite v Mi-	Pissophanite . . 694
Nordmarkite . v 333	Osmelite v 339	crocline . . . p 87	Pistomesite . . . 720
Nosite 308	Osmiridium . . s 7	Petalite 244	Pitchblende . . s 190
Notite v 425	Osteolite . . . v 492	Petrified Wood v 231	Pitch, Mineral . .
Noumeaite . . s 416A	Ottrelite . . . v 458A	Petrolene . . . part	s 830, &c
Novaculite . . v 231	Ouvarovite . . v 271	of 880, &c	Pitchstone . . . v 316
Nussierite . . . v 493	Owenite v 460	Petroleum . 761, &c	Pitkarandite . . 354
Nuttalite v 299	Oxammite . . . p 87	Pettkoite 646	& v 238
	Oxaverite . . . v 370	Petzite 58A	Pittasphalt . . . s 830
OBSIDIAN . . v 316	Ozarkite v 377	Phacolite . . . v 386	Pitticite 581
Ochran 420C	Ozocerite . . . 780	Pharmacolite . 520	Pittinite v 209
Ochre, antimony		Pharmacosider-ite . . . 558	Plagiocitrite . . p 87
s 227 etc	PACHNOLITE 168	Phenacite 267	Plagioclase, a group
bismuth s 222	Pacite 96	Phengite v 293	spars.
brown s 206	Pagodite . . v 422, 400	Philadelphite v 445A	Plagionite 100
chrome 464	Paisbergite . v 241	Phillipite . . . p 87	Planerite 564B
iron v 180	Palagonite . . 425	Phillipsite . . . 389	Plasma v 231
molybdic . . . s 224	Pallorgskite . 358	Phlogopite . . . 288	Plaster of Paris .
plumbic s 177	Palladium . . . 5	Phoenicochroite 643	s 654
red v 180, 202	Gold v 1	Pholerite 418	Platiniridium . . 4
tantalic s 230A	Pandermitte . v 600A	Phosgenite . . . 733	Platinum 3
telluric s 230	Paposite p 87	Phosphocerite v 491	Plattnerite . . . 201
tungstic s 225	Paracolumbite v 181	Phosphochro-	Pleonaste v 183
uranic s 710	Paradoxite . v 316	mite p 87	Pleonecrite . . . p 87
yellow v 206	Paraffin . . . s 780, &c	Phosphorite . . v 492	Plessite v 86
Ochrolite . . . p 87	Paragonite . . 431	Phosphurany-	Pleurasite . . . p 87
Octahedrite . . 194	Paralogite . . n 300	lite p 87	Plinian 94A
Odontolite . . . v 563	Paraluminite . 693	Photite n 241	Plinthite . . . v 420C
Oellacherite . . 433	Parankerite . v 717	Phyllite 458A	Plombierite . . 340A
Oerstedite . . . 272D	Paranthite . . . 298	Phylloretin . . n 793	Plumbago s 25
Ogcoite v 452	Parasite v 597	Physalite . . . v 325	Plumbalophane .
Oisanite s 194, v 276	Parastilbite . v 393	Piazite 880C	v 374
Okenite 341	Parathorite . 836	Picite p 87	Plumbic Ochre s 177
Oktibbehite . . v 13	Pargasite . . . v 247	Pickeringite . . 678	Plumbocalcite v 715
Olafite v 815	Parisite 731	Picotite v 183	Plumbogummite 556
Oldhamite . . . 56A	Paraphite . . . v 422	Picranalcime . n 383	Plumbomanganite .
Oligoclase . . . 814	Partschinite . 281	Picroallumo-	p 87
Oligon Spar . . v 721	Partzite v 222	gene p 87	Plumbonacrite p 88
Olivenite 536	Passaunte . . v 300	Picroepidote . . p 87	Plumbostannite p 88
Olivine v 259	Passyite v 231	Picrofluite . . . 470A	Plumbostib . . . v 122
Omphacite . . . 288A	Pastreite 684A	Picrolite v 411	Plumose Mica v 293
Oncosin v 422	Pateraite . . . 618	Pieromerite . . . 658	Ore s 112
Onegite v 204	Paulite s 235	Picropharmaco-	Polianite v 199
Onofrite s 65A	Pea Stone . . . v 715	lite 520A	Pollucite 251
Ontariolite . . v 299	Pealite v 232	Picrophyll . . . 352	Polyadelphite v 271
Onyx v 231, 715	Pearl Mica . . s 459		
Mexican v 715	Sinter v 232		

Polyargite . . . v 422	Pyrites Cellular v 90	Red Silver Ore s 117	Ruby Spinel . v 183
Polyargyrite . 40C	Cockscomb . s 90	& 118	Ruin Marble . v 715
Polyarsenite . p 88	Copper . . . s 78	Zinc Ore . s 176	Rutherfordite . 486
Polybasite . . 181	Iron s 75	Reddingite . . p 88	Rutile 193
Polychrcilite . v 426	Radiated . . v 90	Reddle v 180	
Polycrase . . . 481	Spear v 90	Redingtonite . p 88	SACCHARITE v 812
Polydymite . . p 88	Tin s 80	Redondite . . p 88	Safflorite . v 83
Polyhalite . . . 656	Pyrosaurite . . 215	Redruthite . . s 61	Sagenite 193 in 281
Polyhydrite . . 442	Pyrochlore . . 471	Refdanskite . 412A	Sahlite v 238
Polylite v 238	Pyrochroite . . 211	Reichite . . . v 715	Sal-Ammoniac 139
Polymignite . . 482	Pyroclaseite . v 492D	Reinite p 88	Salt s 112
Polysphaerite . v 493	Pyropisite . . v 168	Reissacherite . v 218	Salt peter . . s 590
Polytelite . . . 126	Pyroguanite v 492D	Reissite 393A	Samaraskite . 478
Poonahlite . . v 379	Pyrolusite . . 199	Remingtonite . 748	Sammetblende v 204
Porcelain Clay v 419	Pyromorphite . 493	Rensselaerite . v 399	Samoite 421
Porcellophite . v 411	Pyrope v 271	Ressanite . . . 346A	Sandbergerite . v 127
Porpezite . . . v 1	Pyrophosphorite	Retinalite . . v 411	Sandstone . . v 231
Portite 404D	p 88	Retinellite . . 825	Flexible . . . v 231
Posepnyite . . p 88	Pyrophyllite . 400	Retzbanvite . p 88	Sanidin v 316
Potash Alum . s 674	Pyrophysalite v 325	Reussinite . . 810	Saponite 417 & v 406
Feldspar . . . s 816	Pyropisite . . 781C	Rhabdite . . . p 88	Sapphire . . . v 179
Pot-et-one . . . v 899	Pyroretinite . 809	Rhabdophane p 88	Sapphirine . . 335
Potters' Clay . s 419	Pyrorthite . . v 278	Rhætzite . . . v 324	Sarawakite v 220 (?)
Prase v 231	Pyroscheererite	Rhagite 577	Sarcolite 296 & v 387
Prasecolite . . v 426	n 798	Rhodallite . . n 405	Sarcooside . . v 499
Prasilite . . . n 454	Pyrosclerite . 445	Rhodite v 1	Sard v 231
Prasin v 543	Pyrosomalite . 369	Rhodium gold v 1	Sardonvix . . v 231
Predazite . . . 742	Pyrostilpnite . 115	Rhodizite . . . 598	Sarkinite . . . p 88
Preggratite . . v 431	Pyroxene . . . 238	Rhodochrome v 448	Sartorite . . . 105
Prehnite 363	Pyrhrhite . . . 837	Rhodochrosite 722	Saspachite . . 398
Prehnitoid . . v 302	Pyrhrholite . . v 422	Rhodonite . . . 241	Sassolite . . . 594
Preunnerite . . v 715	Pyrhrhosiderite v 204	Rhodophyllite v 448	Satin Spar v 654 & v 715
Priceite 600A	Pyrhrhotite . . 68	Rhomb Spar . . s 716	
Prochlorite . . 452		Rhyacolite . . v 316	Saundersite . . v 280
Proidomite . . . p 88	QUARTZ . . . 231	Ribbon Jasper v 231	Savite v 378
Prosopite . . . 171	[A very full list of the varieties is given in the "Classified List of Species."]	Richellite . . p 88	Scacchite . . . 156
Protheite . . . v 238	Quenstedtite . p 88	Richterite . . v 247	Scapolite . s 299 & c
Protobastite . v 234	Quicksilver . s 8	Riebeckite . . p 88	Scarbroite . . 376A
Protovermiculite	Quincite . . . v 350	Riemannite . . v 374	Schapbachite . 36A
n 445A		Rinkite p 88	Scheelite . . . 614
Proustite . . . 118		Rionite v 125	Scheererite . . 772
Przibramite v 204, 56		Ripidolite . . 450	Schefferite 247 C & v 238
Pseudospatite v 492		Rittingerite . 116	
Pseudobrookite p 88	RABDIONITE 218E	Rivotite . . . 507A	Schiller Spar 412 & v 238
Pseudocotunnite	Radiated Py-	Rochlederite . 811	
p 88	rites v 90	Rock Crystal . v 231	Schirmerite . 112B
Pseudomalachite 543	Radiolite . . . v 378	Meal v 715	Schlanite . . . 812
Pseudonatrolite p 88	Rahtite v 56	Milk v 715	Schneebergite p 88
Pseudophite . . v 448	Raimondite . . 684	Salt s 138	Schneiderite . v 343
Pseudotriplite n 498	Ralstonite . . 163A	Rœmerite . . . 632	Schönite . . . v 658
Psilomelane . . 217	Rammelsbergite 92	Rœpperite . . 261A	Schorl s 320
Psittacinite . . p 88	Randanite . . v 232	Rœsslerite . . 523	Schorlomite . 384
Pterolite . . . n 290	Randite p 88	Rogersite . . . p 88	Schraufite . . p 88
Ptilolite p 88	Raphilite . . . v 247	Romanzovite . v 271	Schreibersite . 74
Pucherite . . . 624	Raphisiderite p 88	Romeite 506	Schröckerite
Pufferite . . . v 391	Rastolyte . . v 428	Roscoelite . . p 88	755A
Pumice v 316	Ratofkite . . . v 159	Rose Quartz . . 231	Schrötterite . 376
Puschkinite . . v 276	Rauite 377A	Roselite 526A	Schulzite . . . v 129
Pycnite v 325	Raumite v 426	Rosenbuschite p 88	Schwartzem-
Pyralloilite . . 351	Razoumoffskin 406A	Rosite v 422	bergite . . . 152
v 238 & 399	Realgar 26	Rosterite . . . v 254	Schwatzite . . v 125
Pyrrargillite . v 426	Red Antimony s 226	Rothornite . . 307A	Scleretinite . 808
Pyrrargyrite . 117	Chalk v 180	Rothoffite . . v 271	Scolecite . . . 379
Pyreneite . . . v 271	Copper Ore . s 172	Röttisite . . . v 416	Scorodite . . . 553
Pyrgom v 238	Iron Ore . . . s 180	Rubellan . . . n 289	Scorza v 276
Pyrite s 75	Ochre v 180	Rubellite . . . v 320	Scotiolite . . v 435
Pyrites s 75	Oxide of Cop-	Ruby v 179	Scoulerite . . v 377
Arsenical . . . s 49	per s 172	Blende s 117	Scovillite s Rhab-
Capillary . s 66, 90	Oxide of Zinc s 176	Silver . s 117, 118	dophane . . . p 88

Seebachite . . .	388A	Soda Nitre . . .	591	Striegisau . . .	v 564	Tavistockite . . .	566
Selenite . . .	v 654	Spodumene . . .	s 314	Strigovite . . .	454A	Taylorite . . .	626
Selensulphur . .	28	Sodalite . . .	305	Stroganovite . .	v 299	Tecoretin . . .	v 784
Sellaite . . .	163B	Sombrierite . .	492D	Stromeyerite . .	62	Tectite . . .	662A
Selwynite . . .	463	Somervillite . .		Stromnite . . .	v 728	Tellapryrine . .	v 75
Semi-opal . . .	v 282		v 274, 346	Strontianite . .	728	Tellurate of Cop-	
Semseyite . . .	p 88	Sommarugaite . .	v 86	Strontianocalcite		per and Lead p 89	
Senarmontite . .	220	Sommite . . .	v 304		v 715	Telluric Bismuth	
Sepiolite . . .	402	Sonomaite . . .	p 88	Struvite . . .	516		s 81 & 82
Sericite . . .	430A	Sordavalite . .	252	Studerite . . .	v 125	Ochre . . .	s 280
Serpentine . . .	411	Spadaite . . .	350	Stübelite . . .	488	Tellurite . . .	230
Serpierite . . .	p 88	Spangolite . . .	p 88	Stützite . . .	p 88	Tellurium . . .	21
Severite v 420 or	406	Spaniolite . . .	v 125	Stüvenite . . .	p 88	Black . . .	s 99
Seybertite . . .	461	Spartaite . . .	v 715	Stylotypite . .	120	Foliated . . .	s 99
Shell Marble . .	v 715	Spathic Iron . .	s 721	Subdelessite . .	v 449	Glance . . .	s 99
Shepardite . .	s 74(?)	Spathiopyrite . .	83A	Succinellite . .	824	Graphic . . .	s 98
Siderazot . . .	p 88	Spear Pyrites . .	v 90	Succinite 799, v	271	White . . .	s 98
Siderite . . .	721	Specular Iron . .	v 180	Sulfatolophan v	374	Yellow . . .	s 98
" . . .	v 231, s 551	Sperryllite . . .	p 88	Sulphatite . . .	625	Tengerite . . .	746
Siderodot . . .	v 721	Spessartite . .	v 271	Sulphohalite . .	p 88	Tennantite . . .	127
Sideroferrite . .	v 18	Sphærite . . .	575	Sulphur . . .	22	Tenorite . . .	s 178
Sideromelane . .	v 316	Sphærocobaltite	p 88	Selen . . .	23	Tephroite . . .	262
Sideronatriite . .	p 88	Sphærostilbite v	892	Sulphuric acid s	625	Teratolite . . .	418A
Siderophyllite . .	v 289	Sphalerite . . .	56	Sundvikite . . .	v 310	Terenite . . .	n 299
Sideroplesite . .	v 721	Sphene . . .	s 329	Sunstone v 314, 316		Teschemacher-	
Sideroschisolite	456A	Sphenoclaste . .	275	Susannite . . .	638	ite . . .	735
Siderosilicite . .	v 425	Spherosiderite . .	v 721	Sussexite . . .	595B	Tesselite . . .	v 870
Siderotantalite v	473	Sphurilite . . .	v 316	Svanbergite . .	584	Tetradymite . .	31
Siegburgite . .	p 88	Sphragidite . .	404A	Swinestone . .	v 715	Tetrahedrite . .	125
Siegenite . . .	v 81	Spiauterite . .	v 70	Syepoorite . . .	53	Tetraphylite . .	v 498
Silex . . .	s 231	Spinel . . .	183	Syhedrite . . .	v 392	Thalheimite . .	v 94
Silfbergite . . .	p 88	Ruby . . .	v 183	Sylvanite . . .	98	Thalite . . .	v 417
Silica . . .	s 231	Spodiosite . . .	p 88	Sylvite . . .	137	Tharandite . .	v 716
Siliceous Sinter		Spodumene . . .	243	Symplesite . .	525	Thenardite . . .	629
" . . .	v 231, 232	Soda . . .	s 314	Synadelphite . .	p 88	Thermonatrite .	737
Silicified Wood v	231	Staffelite . . .	492C	Syngenite . . .	656A	Thermophyllite	
Silicite . . .	v 811	Stalactite . . .	v 715, &c	Syntagmatite . .	v 247		v 411
Sillimanite . .	v 323	Stalagmite v 715, &c		Szaboite . . .	p 88	Thierschite . .	757
Silver . . .	2	Stankite . . .	815	Szabelyite . . .	595	Thinolite . . .	v 715
Antimonial . .	s 35	Stannite . . .	80	Szmikite . . .	p 88	Thiorsaite . . .	v 310
Arsenical . . .	s 35	Stassfurtite . .	v 597			Thomaite . . .	n 725
Bismuth . . .	s 36	Staurolite . . .	833	TABERGITE v 448		Thomsenolite . .	169
Brittle . . .	s 130	Staurotide . .	s 833	Tabular spar . .		Thomsenite . . .	377
Flexible . . .	v 63	Steargillite . .	v 406		s 237	Thorite . . .	366
Glance . . .	s 40	Steatite . . .	v 399	Tachhydrite . .	148	Thorogummitte p	89
Horn . . .	s 140	Steeleite . . .	v 396	Tachyaphaltite	272C	Thraulite . . .	v 439
Ruby . . .	s 118, 117	Steenstrupine	p 88	Tachylite . . .	253	Thrombolite . .	p 89
Simlaite . . .	v 418	Steinheilite . .	v 287	Taenite . . .	v 13	Thulite . . .	v 280
Simonyite . . .	659A	Steinmannite . .	v 44	Tagilite . . .	541	Thuringite . . .	460
Sinopite . . .	420A	Stephanite . . .	130	Talc . . .	399	Tiemannite . . .	65
Sinter, Calc . .	v 715	Stercorite . . .	515	apatite . . .	492F	Tiger Eye . . .	s 249
Siliceous v 281, 232		Sterlingite . .	v 430	chlorite . . .	n 450	Tile Ore . . .	v 172
Sipyllite . . .	p 88	Sternbergite . .	63	Talcite . . .	v 429	Tilkerodite . .	v 45
Sismondine . .	v 458	Stetefeldtite . .	v 228	Talcoid . . .	400A	Tin . . .	16
Sisserskite . .	v 7	Stibiconite . .	228	Talcosite . . .	p 88	Ore . . .	s 192
Skutterudite . .	84	Stibioferrite . .	587	Tallingite . . .	153A	Pyrites . . .	s 80
Sloanite . . .	397	Stibnite . . .	29	Tallow, mineral		Stream . . .	v 192
Smaltine . . .	v 83	Stilbite . . .	392		s 779	Stone . . .	v 192
Smaltite . . .	83	Stilpnomelane .	407	Tantaliochre . .	230A	Tincal . . .	s 599
Smaragd . . .	v 254	Stilpnosiderite .	s 206	Tantalite . . .	473	Tincalconite . .	v 599
Smaragdite v 247, 238		Stinkstone . . .	v 715	Tapalpite . . .	p 88	Tinder Ore . . .	v 112
Smectite 405, & v	420	Stirlingite . . .	s 176	Tapiolite . . .	475	Titanic Iron . .	s 181
Smithsonite . .	723	Stolpenite . . .	v 406	Tarapacaita . .	p 89	Titanite . . .	329
Smoky Quartz v	231	Stolzite . . .	616	Targionite . . .	v 44	Titanomorphite	
Topaz . . .	v 231	Strakonitzite . .		Tarnovicitte . .	v 724		v 329
Snarumite . . .	295A		355, v 238	Tasmanite . . .	817	Tiza . . .	s 602
Soapstone v 419, 417		Stratopseite . .	v 437	Tauriscite . . .	662	Toad's-Eye Tin v	192
Soda Alum . . .	s 677	Stream Tin . . .	v 192	Tautoclin . . .	v 717	Tobermorite . .	p 89
Feldspar . . .	s 315	Strengite . . .	p 88	Tautolite . . .	v 278	Tocornalite . .	p 89

Topaz	325	Uraniothorite . p	89	Walchowite	800	Xanthite	v 273
Smoky	v 231	Uranotil	p 89	Waldheimite	247A	Xanthoarsenite p	89
Topazolite	v 271	Urdite	v 496	Walkerite	v 839	Xanthoconite	133
Torbanite	804	Urpethite	778	Wallerian	v 247	Xantholite	v 333
Torbernite	572	Urusite	p 89	Walmstedtite	v 718	Xanthophyllite v	461
Torrelite	v 474	Utahite	p 89	Walpurgite	573A	Xanthorhthite	v 278
Touchstone	v 231			Waltherite	n 753	Xanthosiderite	207
Tourmaline	320			Waluewite	v 461	Xenolite	v 328
Trautwinit	385A	VAALITE	445D	Wapplerite	520C	Xenotime	490
Traversellite	353	Valencianite		Warrenite	p 89	Xonaltite	340
	& v 238		v 316	Warringtonite v	701	Xylochlor	v 370
Travertine	v 715	Valentinite	221	Warwickite	606	Xyloretinite	805
Tremenheerite v	25	Vanadate from L.S		Washingtonite v	181	Xylotile	359
Tremolite	v 247		623A	Wasite	n 278		
Trichalcite	533	of Lime and Cop-		Water	175		
Triclasite	v 426	per	622A	Wattevillite	p 89		
Tridymite	231A	Vanadio Ochre	201A	Wavellite	554	YELLOW	
Trinacrite	v 425	Vanadinite	621	Wax, Mineral s	780,	OCHRE	v 206
Trinkerite	817A	Vanadiolite	622B	etc		Yenite	s 284
Triphylite	498	Variegated copper		Webskyite	p 89	Yttrialite	p 89
Triplite	499		s 49	Wehrilite 33 & v	284	Yttrocalcite	v 160
Triploidite	p 89	Variscite	565A	Weissigite	v 316	Yttrocercite	160
Tripoli	v 232	Varvacite	v 199	Weissite	v 426	Yttrilmenite	v 477
Tripolite	v 232	Vasite	v 278	Wernerite	299	Ytrotantalite	477
Trippkeite	p 89	Vauquelinite	644	Werthemanite p	89	Ytrotitanite	s 331
Tritochorite	p 89	Velvet Copper Ore		Westanite	323A		
Tritomite	365		s 703	Wheelerite	813B		
Trögerite	573B	Venasquite	v 458A	Wheel Ore	s 119	ZARATITE	747
Troilite	67	Vermiculite	445A	Whewellite	756	Zeogonite	s 372
Trolleite	555	Vermilion	s 64	White Vitriol s	666	Zeolite, Cubic	
Trona	738	Vermontite	v 94	Whitneyite	89		s 383 & 386
Troostite	v 266	Vesbine	p 89	Wichtisite	250	Efflorescing s	343
Tscheff kinite	332	Vesuvianite	273	Willcoxite	459B	Feather	s 378
Tschermakite	314A	Vesselyite	541A	Willemit	266	Fibrous	s 378
Tschermigite	673	Victorite	234A	Williamsite	v 411	Foliated s 392 & 394	
Tuesite	v 419	Vierzonite	v 420B	Wilsonite v 422 & 299		Needle	s 378
Tufa, calcareous v	715	Vietinghofite	v 478	Wiluite	v 271	Pyramidal	s 370
Tungstic Ochre s	225	Villarsite	362	Winklerite	526C	Radiated	s 392
Tungstite	225	Violan	238B	Winkworthite	601A	Zepharovichite	550A
Turgite	202	Vitreous Copper		Wiserine	v 194	Zeugite	v 519
Turnerite	497		s 61	Withamite	v 276	Zeunerite	572A
Turquois	563	Vitriol, blue	s 669	Witherite	726	Zeuxite	n 320
Tyrite	v 483	cobalt	s 667	Wittichenite	121	Zietrisikite	781
Tyrolite	546	copper	s 669	Wittingite	v 437	Zinc	14
Tysonite	p 89	green	s 664	Wocheinite	v 208	Blende	s 56
		lead	s 633	Wöhlerite	265	Bloom	s 749
		nickel	s 668	Wölchite	v 119	Bromide	158
UDDEVALLITE		white	s 666	Wolchonskoite	462	Iodide	157
	v 181	zinc	s 666	Wolfachite	92A	Ore, Red	s 176
Uigite	363A			Wolfram	s 610	Spinel	s 185
Uintahite	p 89	Vivianite	524	Wolframite	610	Vitriol	s 666
Ulexite	602	Voglianite	709	Wollastonite 237 & v		Zincaluminite p	89
Ullmannite	87	Voglite	755		339	Zincite	176
Ullmarine	s 306	Voigtite	428	Wollongongite	830E	Zinkaurite	750A
Unghwarite	v 408	Vollborthite	622	Wolnyn	v 630	Zinkenite	106
Unionite	v 280	Volcanic Glass v	316	Wood Opal	v 232	Zinkosite	634
Uraconite	710	Volgerite	229	Petrified	v 231	Zinnwaldite	v 294
Uralite	v 288	Voltaite	675	Tin	v 192	Zippeite	708
Uralorthite	v 278	Voltzite	57	Woodwardite	704	Zircon	272
Uraninite	190	Vorhauserite	v 411	Wulfenite	617	Zirlite	n 212
Uranite	s 572, 573	Vosgite	v 311	Wurtzilite	p 89	Zöblitzite	v 411
Uranium Ochre s	708	Vulpinite	v 632	Wurtzite	70	Zoisite	280
Uranochalcite	706					Zonochlorite	v 863
Uranocircite	p 89					Zorgite	46
Uranophane 376B(?)		WACKENRO-				Zunyite	p 89
Uranopilite	p 89	DITE	v 218			Zurite	v 274
Uranosphærite 624A		Wad	218	XANTHIOSITE		Zwieselite	v 499
Uranospinit	573C	Wagite	v 361		p 89	Zygadite	n 315
Uranothallite	p 89	Wagnerite	495	Xanthitan	v 329		

